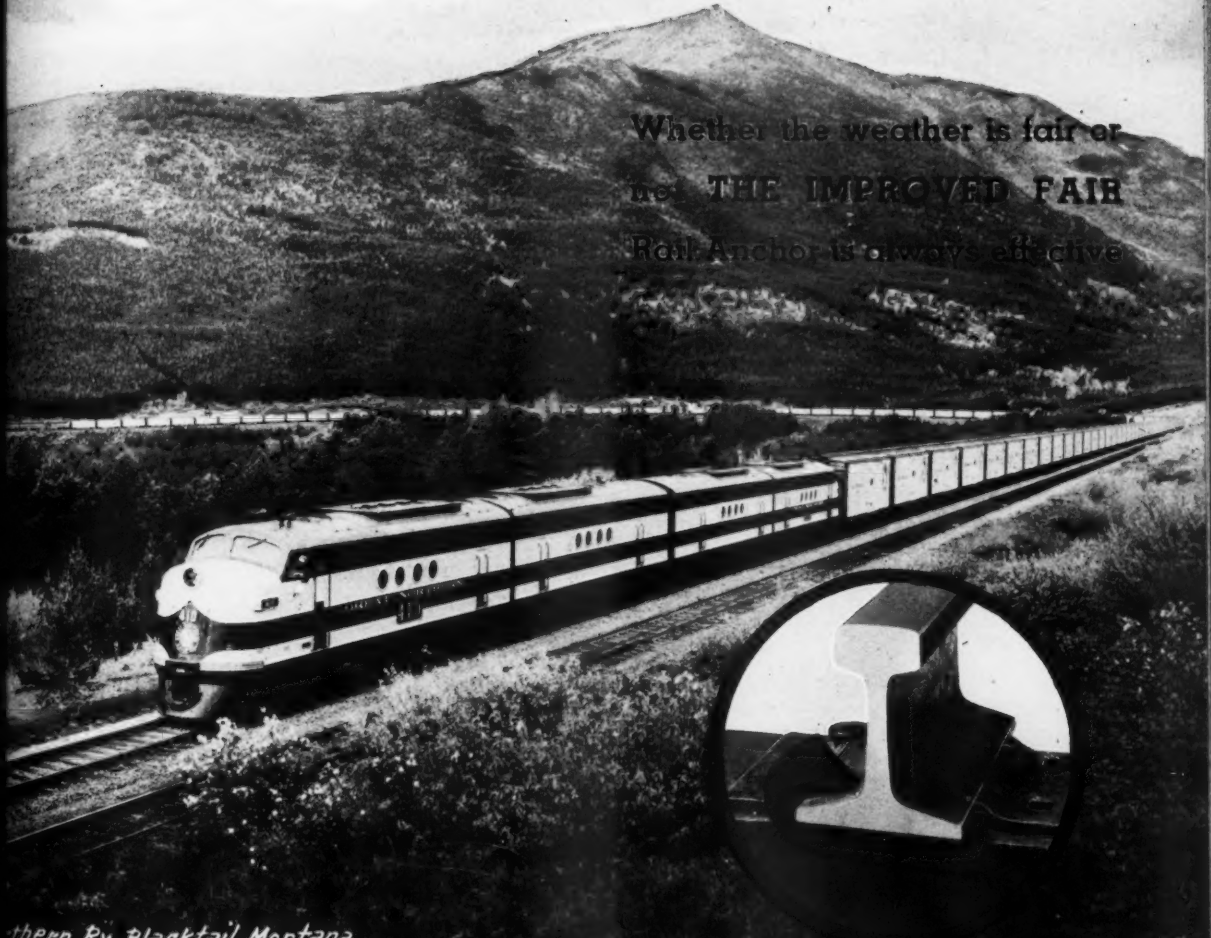
ROADMASTERS CONVENTION NUMBER OCTOBER, 1947

Railway Engineering and Maintenance

FAIR WEATHER IN THE ROCKIES

Whether the weather is fair or not THE IMPROVED FAIR Rail Anchor is always effective



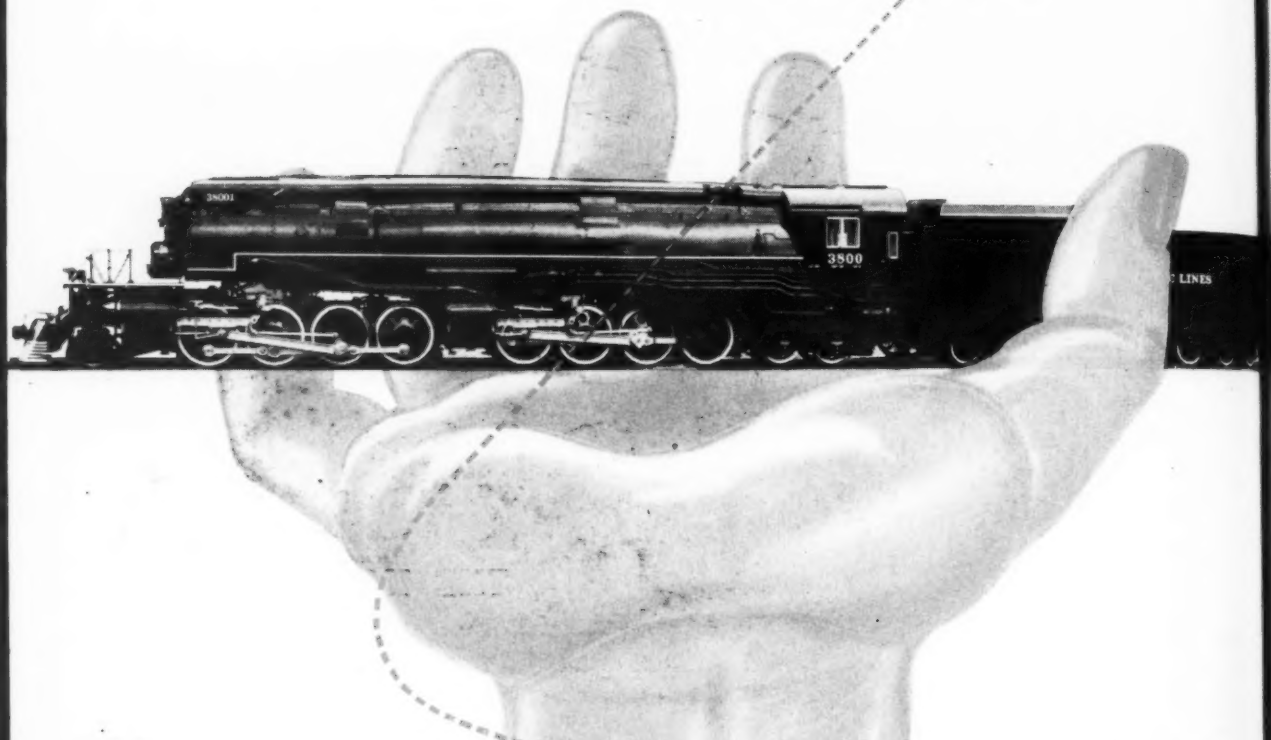
thern Ry. Blacktail, Montana

THE P. & M. CO.

• NEW YORK • DENVER • WASHINGTON • ST. LOUIS • CLEVELAND • ST. PAUL • BOSTON • SAN FRANCISCO

Match for

345 TON GIANTS



MULTI-TON GIANTS like this 16-driver articulated job on the Southern Pacific haul heavier revenue loads.

. . . and place heavier responsibilities on right-of-way maintenance men.

Although new, heavier rail eases the maintenance burden, it can't solve the problem of joint deterioration due to strains imposed by heavier motive power and wheel loads and higher speeds.

But these monster power plants meet their match in Reliance Hy-Crome Pressure Springs. Made from fatigue-resisting steel of special analysis, developed by Reliance Research Engineers in cooperation with railroad men who know maintenance problems, Reliance Hy-Crome Pressure Springs have powerful, long-enduring reactive force which automatically compensates for looseness as a result of wear in rail bolts. Rail joints stay *tighter longer.*

For helpful hints on maintenance economy, write for a copy of the Reliance Hy-Crome family folder

Reliance **HY-CROME** *pressure springs*

EATON

EATON MANUFACTURING COMPANY

RELIANCE DIVISION
MASSILLON, OHIO

Sales Offices: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal

THE SAFETY FLAME THAT *Keeps Switches Open*

When blizzards howl and snow and ice are doing their best to clog traffic . . . that's when Bethlehem's Winter King Switch Heaters really do their stuff.

They are small, compact, out-of-the-way—but their little shielded flame is an investment in safety. Fighting snow as it falls, these heaters keep switches open, eliminate freeze-ups far more effectively than hand methods. Moreover, even in gusty winds, your ties are protected from the flame by a guard on each side of the burner.

The fuel opening is covered by a self-closing cap, and Winter Kings can be filled safely while in operation. Using kerosene, each unit holds enough oil for nine to fifteen hours of burning when the storm is of average severity. Heat is regulated by positioning the cover that slides over the combustion chamber. With 16½-ft switches, four Winter Kings to a side are generally recommended. Even in heavy storms, one man can usually take care of a large group and still have time left for other duties.

If ice is something to reckon with in your part of the country, you'll want to know more about Winter Kings. They're easy to install . . . cheap to operate . . . reliable in action.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

Winter King **SWITCH HEATERS** ★ BETHLEHEM STEEL ★

Published monthly by Simmons-Boardman Publishing Corporation, 105 W. Adams St., Chicago 3, Ill. Subscription price: United States and Possessions, and Canada, $2.00 for one year; $3.00 for two years. Single copies 50 cents. Entered as second-class matter January 20, 1933, at the post office at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., post office. Address communications to 105 W. Adams St., Chicago 3, Ill.

for BETTER roadbed stabilization

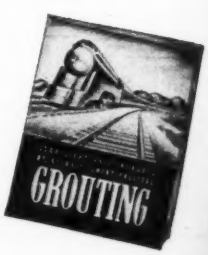
THE MEN in the picture are preparing a grouting mixture for stabilizing soft track. The drum at the left contains *Texaco No. 24 Emulsified Asphalt*. When this is added — in proportions sometimes as small as 1/10 gallon per cubic foot of sand—to ordinary cement-and-sand grout, the improvement in results is often astonishing.

Texaco No. 24 Emulsified Asphalt — developed especially for this purpose—helps the grout flow more freely, penetrate more thoroughly, and seal better and faster. At the same time, it permits the use of leaner, more economical mixtures, helps waterproof and stabilize the soil without loss of soil resiliency.

Pressure grouting, using this Texaco Asphalt-cement mixture, is the modern way of roadbed stabilization — "better" because of easy application, lasting effectiveness, low first cost, and tremendous savings in maintenance.

For the complete story on cost-saving, asphalt-cement pressure grouting, call the nearest Railway Sales Division office listed below, or write:

The Texas Company, *Railway Sales Division*, 135 East 42nd Street, New York 17, New York.



SEND FOR this fact-packed, 16-page, illustrated book. Describes the development of asphalt-cement pressure grouting, outlines a practical working set-up, shows costs, and benefits secured by a leading railroad.

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TEXACO Emulsified Asphalt
FOR GROUTING

Tune in . . . **TEXACO STAR THEATRE** presents the **TONY MARTIN SHOW** every Sunday night. See newspaper for time and station.

2 more NORTHWESTS for the Pennsy"!

There is no better testimonial to satisfactory service. It is significant that after using Northwests for years the Pennsylvania R. R. has purchased two more Northwests making 39 Northwests purchased by this leader among America's Railroads.

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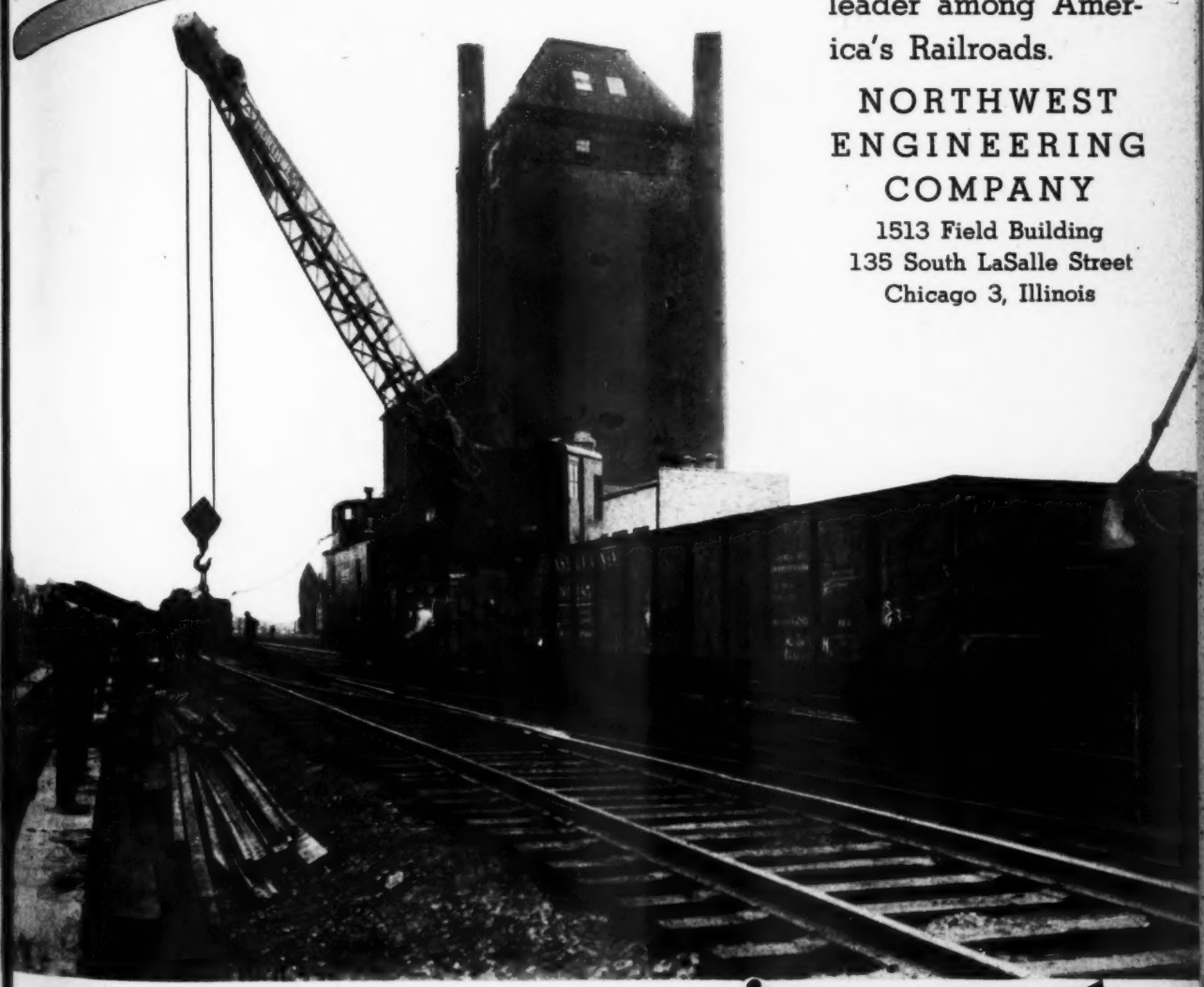
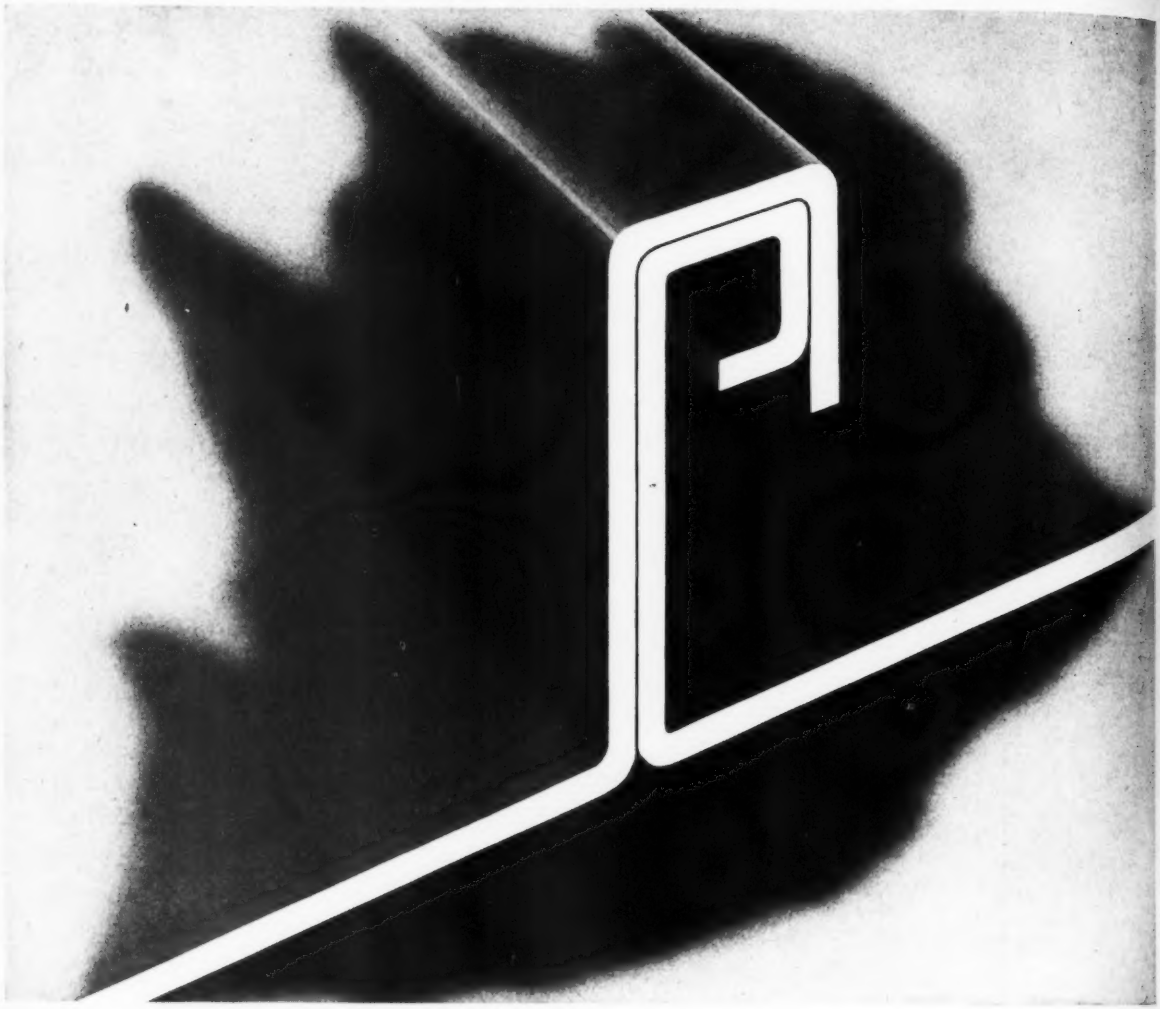


NORTHWEST

THE ALL PURPOSE RAILROAD MACHINE
SHOVEL • CRANE • DRAGLINE • PULLSHOVEL

Proved on the Nation's Leading Railways

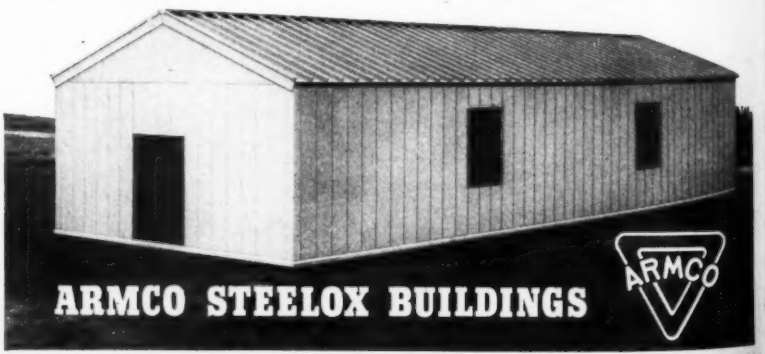


This Joint Gives Buildings "Old Age Benefits"

Here is simple, low-cost insurance against the time when ordinary buildings begin to sag and show their age. The patented, Armco-developed joint withstands expansion, contraction and unequal settlement. It keeps Standard STEELOX Buildings trim and youthful. ● You'll also reap immediate benefits. With the revolutionary STEELOX method, the jointed panels provide both structural support and a finished surface. Erection is simplified, appearance improved and weathertight construction assured. Unskilled workmen quickly join the panels into a sturdy, maintenance-free structure.

There are other advantages in using Standard STEELOX Buildings. They are made of Galvanized ARMCO PAINTGRIP Steel and can be painted immediately or left unpainted. And the paint lasts longer. STEELOX Buildings have the long life and low upkeep of a permanent structure, yet when necessary they can be quickly dismantled and re-erected at another location without loss of material. All parts are uniformly strong and the all-steel construction is an excellent fire-barrier.

STEELOX Buildings are prefabricated in a wide range of standard sizes to meet your requirements. Write for complete data. Armco Drainage & Metal Products, Inc., 1665 Curtis Street, Middletown, Ohio.



BLUE BRUTE TRACK TEAMS RACE AHEAD

Whenever maintenance crews are under *real* pressure you'll find Blue Brute Teams setting the pace.

Speed and stamina stand out in every Blue Brute. Take the new, streamlined Hand-I-Air Compressor . . . it's so light two men handle it — yet it has the guts of a heavyweight — delivers 60 cubic feet of low-cost air per minute with the smooth, effortless power of a champion. Light, tight Feather* Valves efficiently control the flow of power from this two-wheeled tornado . . . you get a Blue Brute that "breathes" like a well-conditioned athlete. No other compressor so small stays on the job so long without "time out" to catch its breath!

The four WTT-7 Tie Tampers with leakproof throttles are lean, tough, fast . . . weigh only 42 pounds each . . . are perfectly matched to the compressor for efficiency that adds up to more finished surfacing per day.

Other Blue Brutes . . . grouters . . . contractors' pumps . . . portable cement mixers . . . rock drills and pavement breakers . . . all team up to get more work done at less cost. Investigate them now . . . you'll find *there's more worth in Worthington-Ransome.*

H7-6

WORTHINGTON

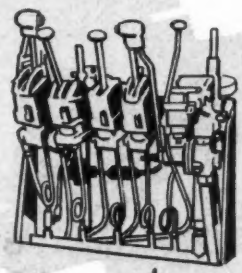
Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Massachusetts

BUY BLUE BRUTES

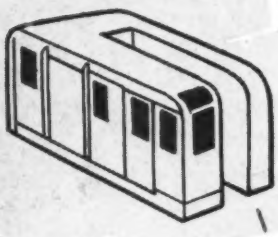
Pneumatic Grouter | Portable Concrete Mixer | Self Priming Centrifugal Pump | Hand Held Air Tools | Railcar Compressor

FOR EVERY CONSTRUCTION AND MAINTENANCE JOB

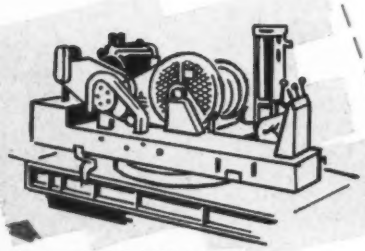
Tested and Proved . . . .



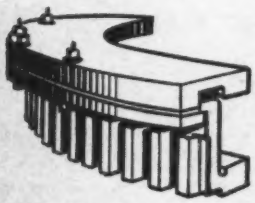
FINGER TIP AIR CONTROLS reduce waste motion and operator-fatigue. Control levers positioned for easy, natural use of hands. Over-excitation of magnet controlled by push-button.



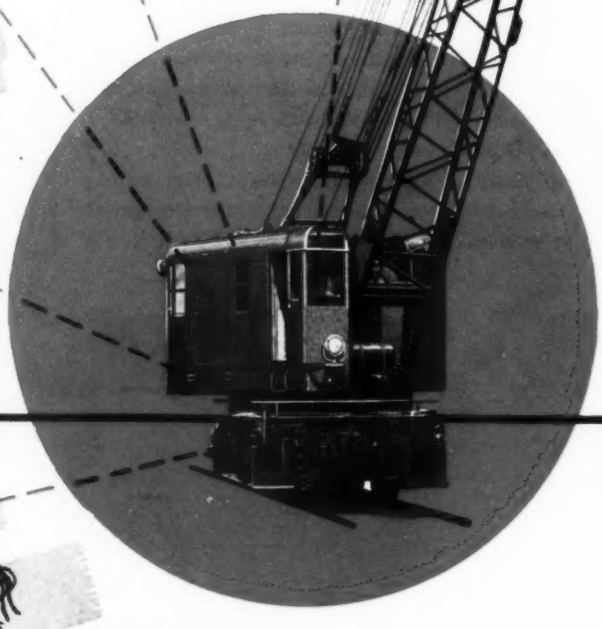
FULL VISION CAB places operator at side of boom, not behind it, gives him full view of load at all times.



CLEAN, EFFICIENT DECK LAYOUT makes maintenance easy. No pyramiding of deck equipment. All machinery enclosed. Welded, rolled steel full width deck.



ENCLOSED ROLLER BEARING TURNTABLE uses American's exclusive, patented interlocking gib ring. Nine foot diameter turntable has 27 bronze bushed conical steel rollers —live, stable load-carriers.



ELECTRIFIED CARBODY has two powerful electric motors driving truck axles through single reduction spur gears and pinions sealed and running in oil.

Diesel Power
to the Deck

Electric Pow
to the Truck

on the World's Toughest Jobs

THE AMERICAN

DIESELECTRIC

A REVOLUTIONARY NEW LOCOMOTIVE CRANE

Scores of major wearing parts eliminated in the underbody . . . a clean, efficient deck, where maintenance work is a matter of minutes . . . smooth, powerful electric motors driving the wheels!

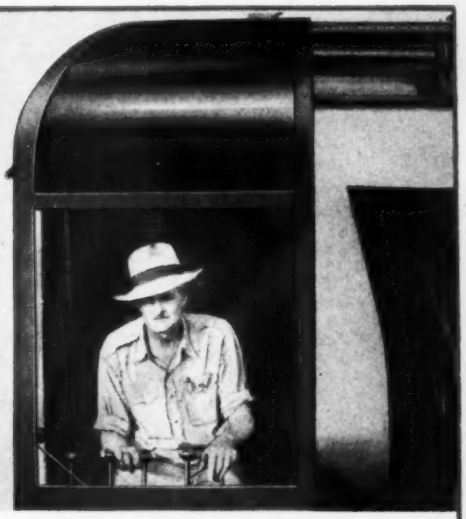
• • • That's the mechanical story of the AMERICAN DIESELECTRIC. But the economic story—established by years of testing on industry's toughest jobs—is even more important: *this crane will earn back its own cost in five years.*

In mechanical cranes, 50% to 75% of all maintenance work has been in the travel mechanism. By designing this clean, simple electrified drive, American Hoist engineers have actually reduced upkeep expense by as much as 25% to 50%!

The AMERICAN DIESELECTRIC is not a converted crane. It is new in every part, from trucks to boom point . . . specifically created for the best utilization of diesel-electric power. Obviously, this was not an "overnight" job of engineering.

Actually, the development of this crane has required about fifteen years. On-the-job tests have now run two to seven years in railroad and industrial operations. Names of users and detailed cost studies will be furnished upon request.

A new catalog, just off the press, gives full specifications and operating data. Mail the coupon below.



ASK THE MAN IN THE CAB!

● Even the world's finest locomotive crane can be no more efficient than its operator. For that reason, American Hoist engineers have given the DIESELECTRIC the most comfortable, orderly and ingenious cab arrangement ever created. The cab is forward of the main deck mechanism, to right of boom. Operator sits high and close to the boom at the best possible angle for guiding his load. Windows front, side and top permit excellent view even in cold weather operation. The cab is fully partitioned from machinery deck . . . clean, quiet and comfortable at all times. Controls are all air-actuated, and levers respond to finger-tip pressure, assuring maximum work output and minimum fatigue.

DIESEL-ELECTRIC LOCOMOTIVE CRANE. PATENT NO. 2083480. TOUCH CONTROL. PATENT NO. 2370856.

American Hoist
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TIME—not just a few years, but a whole decade—has proved in actual service that Barco does more uniform and longer-lasting tamping, at lower cost. Simple and rugged—well balanced—weight adjusted for maximum service with least effort. No other tytamper will do the same work in the same time with the same number of men.

For spot or gang tamping, cribbing, breaking, drilling and winter ice service—put Barco Unit Tytampers on the job. For full information write to Barco Manufacturing Company, Not Inc., 1805 Winnemac Avenue, Chicago 40, Illinois.

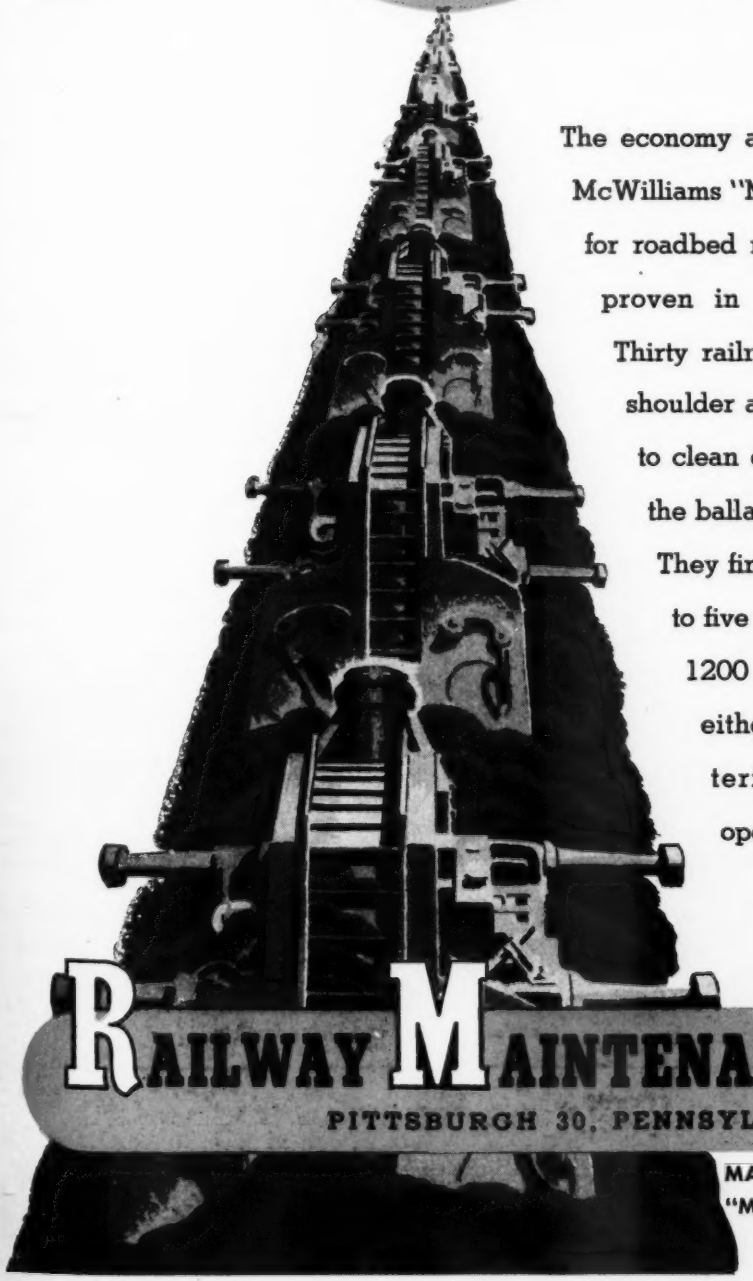
BARCO

UNIT TYTAMPERS

Free Enterprise—the Cornerstone of American Prosperity

389

McWILLIAMS MOLES USED BY 30 RAILROADS



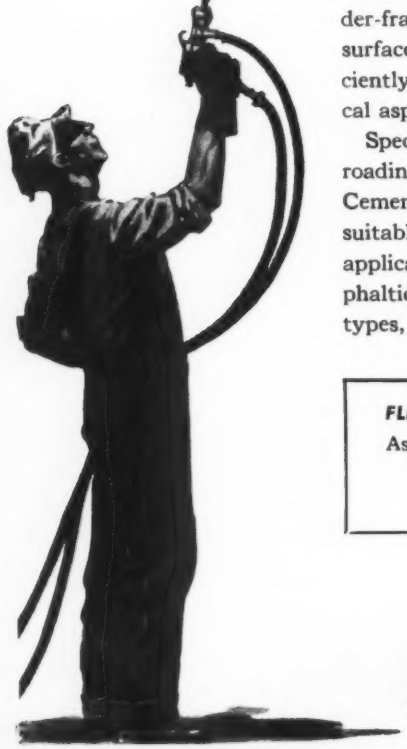
The economy and efficiency of the McWilliams "Mole" Ballast Cleaner for roadbed maintenance is being proven in service every day. Thirty railroads use 389 of the shoulder and intertrack models to clean dirt and cinders from the ballast of their roadbeds. They find that a crew of four to five men can clean 850 to 1200 feet in 8 hours with either model without interference with train operations.

RAILWAY MAINTENANCE CORP.

PITTSBURGH 30, PENNSYLVANIA

MANUFACTURERS OF THE McWILLIAMS "MOLE" and RMC RAIL JOINT PACKING

FOUNTAIN OF YOUTH FOR ROLLING STOCK



Flying gravel, seeping moisture and cinder-laden wind can make freight cars grow old fast.

Protect your rolling stock against these hazards with tough, quick-drying Flintkote Car Cements. Couplers, metal ends, slope sheets, trucks, under-frames . . . any vulnerable metal surfaces . . . can be quickly and efficiently protected with these economical asphalt-base compounds.

Specially formulated to meet railroading requirements, Flintkote Car Cements are available in consistencies suitable for spray, brush or trowel application. Or, you can specify asphaltic emulsions of a wide range of types, fibrated or non-fibrated. Flintkote Railroad Emulsions are "tops" in withstanding weather and severe exposures in the railway field.

More than forty years of research and successful experience are behind the manufacture of Flintkote Railroad Products. Our technical specialists are ready to cooperate with you in the solution of individual problems. Write today, and learn more about Flintkote's fountain of youth for your rolling stock.

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FLINTKOTE MAKES A COMPLETE LINE OF SPECIALIZED RAILROAD PRODUCTS

Asphalt Protective Coatings . . . Car Cements . . . Insulation Coatings . . . Cold-Laid Mastic Flooring Emulsions . . . Building Materials . . . Materials for Waterproofing and Dampproofing.

FLINTKOTE

Products for Industry

STEP UP THE AVAILABILITY OF YOUR DIESELS with *Adequate Refueling Equipment*

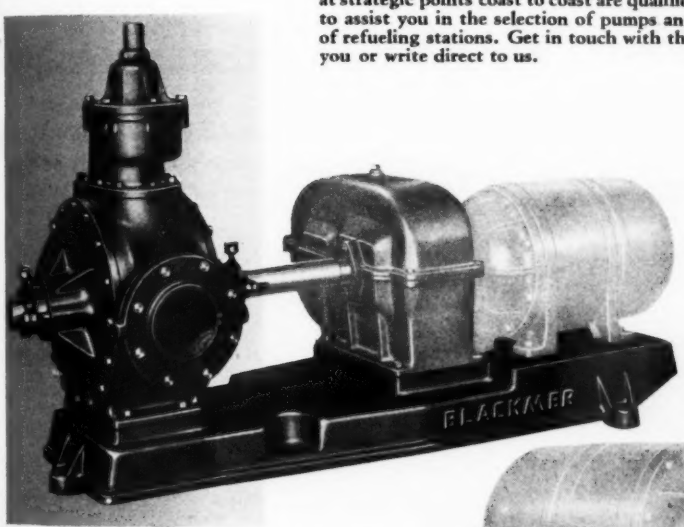
WHEN your Diesels have to be refueled in a matter of minutes to meet tight doubling-back schedules, you can rely on Blackmer Rotary Pumps every time. They have abundant overload capacity to meet any refueling requirements . . . operating pressures to take care of the lift and head. Blackmer design compensates for wear and guarantees sustained capacity.

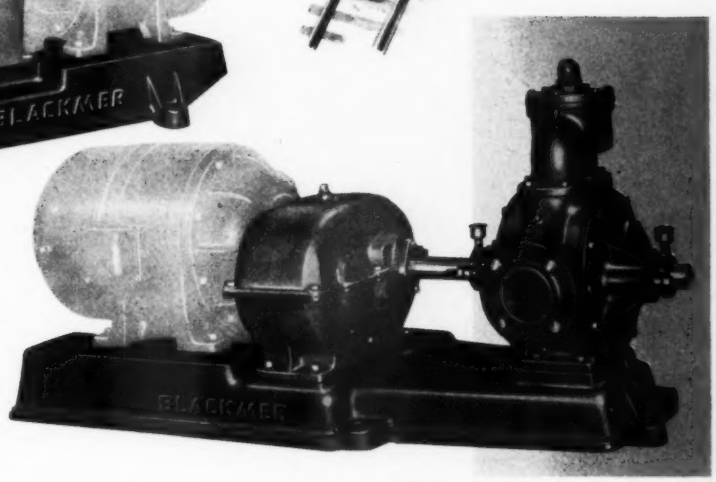
Dieselized divisions of many railroads, among them . . . New York Central, Santa Fe, Chesapeake & Ohio, Burlington, Union Pacific, Chicago and North Western . . . depend upon Blackmer Pumps for refueling from underground tanks at large terminals or from aboveground tanks out on the line. Two units especially suitable for refueling purposes are illustrated here.

SIMPLICITY OF DESIGN . . . EASY TO SERVICE

In Blackmer installations, stand-by equipment is unnecessary. Even if a Blackmer Pump should break down while operating, most of the working parts when worn can be replaced in a very few minutes . . . and the pump is ready to go!

Twenty-eight Blackmer Pump Service Engineers located at strategic points coast to coast are qualified by experience to assist you in the selection of pumps and the laying out of refueling stations. Get in touch with the one nearest to you or write direct to us.





Complete Rotary Pumps and bed plates with, or ready to receive power units and with or without relief valves, and with or without steam jacketing. Capacities from 10 gallons per minute to 750 gallons per minute.

Blackmer Pumps

THE HEART ♥ OF YOUR LIQUID HANDLING SYSTEM

Blackmer Pump Company • Grand Rapids 9, Michigan

NEW Rubber-tire T
Your first cross-trac m

The new high-speed, rubber-tired Tournadozer handles all types of railroad maintenance . . . spreads ballast, "daylights" curves, cleans ditches, backfills around culverts and bridge abutments.

Completes rush jobs fast . . . drives job-to-job at 15 m.p.h. . . . removes slides, fills washouts, straightens tracks . . . reinforces causeways and bridge approaches. Really pays off in emergencies.

Tournadozer gives you 4 speeds forward or reverse, with instantaneous non-stop speed selection . . . enables you to handle sand, gravel, cinders, coal, chemicals, etc., faster and more economically.

Operator rides easy on big low-pressure tires and hydraulic suspension seat . . . air-actuated controls take labor out of operating. No neck-stretching, no clutches to fight . . . no end-of-day slow down.

Tournadozer Trademark

LE TOURNEAU

LET

See your LeTourneau Railroad Distributor NOW for complete information

TOURNADOZER
maintenance dozer...

YES, for the first time in history, you have an off-track, rubber-tired dozer that can go anywhere on your right-of-way in a hurry . . . cross tracks at will . . . make fast, job-to-job moves over pavement, black top or cross country.

Speeds up to 15 m.p.h. . . . forward and REVERSE

The 180 h.p. Model C Tournadozer gives you the high speed operation you've always wanted in a dozer — up to 15 m.p.h. forward and reverse — nearly twice as fast as crawlers.

No gear-shift delay

New constant-mesh transmission in the Tournadozer gives you instant selection of gear ratios anytime . . . without loss of momentum, or stopping to shift gears. Move selector lever to speed you want and air-actuated clutches give it to you RIGHT NOW.

Low center of gravity and wide tire tread assure greater stability . . . short-coupled wheelbase increases maneuverability.

Doesn't tie up rail traffic or train equipment

In cleaning drainage ditches, cutting down banks, spreading cinders around yards, roundhouse or riptracks, Tournadozer will not tie up rail traffic . . . big expensive train equipment or special tools are not needed. Reduces equipment investment, requires fewer men.

Ample traction . . . less maintenance

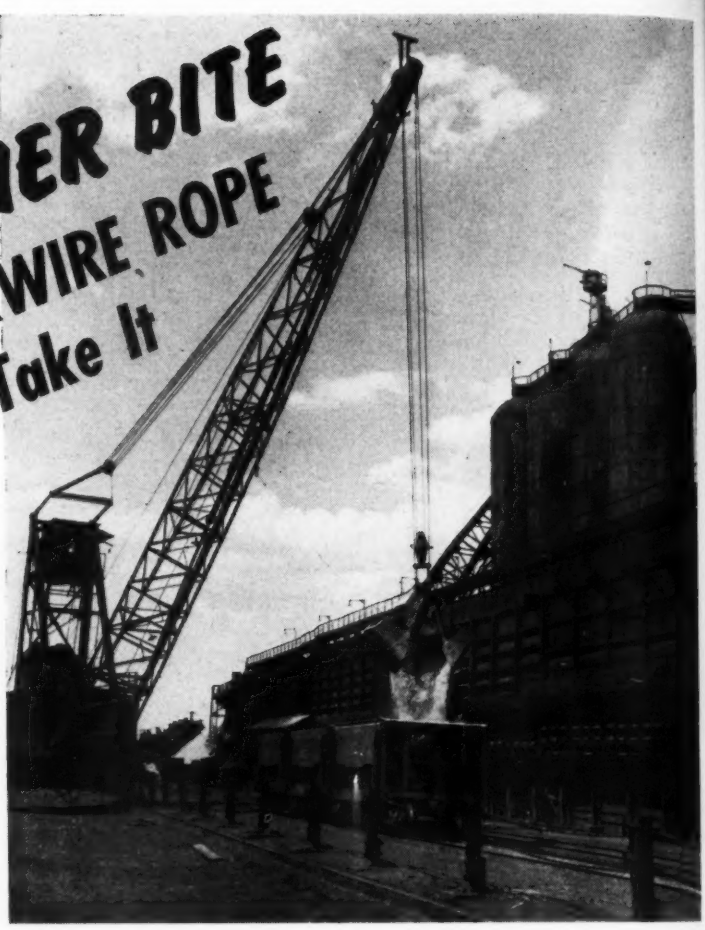
Four big 21:00 x 25 low-pressure tires assure ample flotation and traction for toughest going . . . no track rollers to lubricate . . . no expensive moving parts to grind and wear in abrasive material. You roll on rubber instead of steel.

Seeing is believing

Before you buy a slow-moving, high-maintenance dozer, see the new fast-moving, rubber-tired Model C Tournadozer in action. Your LeTourneau Railroad Distributor can give you complete information on performance, prices and delivery . . . SEE HIM NOW.

LETOURNEAU PEORIA, ILLINOIS HIGH-SPEED RUBBER-TIRED TOURNADOZERS

GRAB ANOTHER BITE ...The WICKWIRE ROPE Can Take It



Select a Wickwire rope best suited for each particular application . . . rope for resistance to impact or abrasion or bending fatigue . . . rope which will stand up on the toughest jobs, and give dependable performance under constant, heavy duty service. Our engineers, benefiting by 125 years experience, "know the ropes". We invite your inquiries on your particular wire rope problems.

Rails, Joints, Tie Plates, Bolts, Spikes, Realock Fence, Woven Wire Fence, Clinton Welded Fabric
. . . all Quality Products of CF&I Serving the Railroad needs.

CF&I & SUBSIDIARIES

A PRODUCT OF WICKWIRE SPENCER STEEL DIVISION

The Colorado Fuel and Iron Corporation

GENERAL OFFICES: DENVER, COLORADO

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ON THE PACIFIC COAST: CALIFORNIA WIRE CLOTH CORPORATION, OAKLAND 4, CALIF.

Pound for Pound, Inch for Inch...

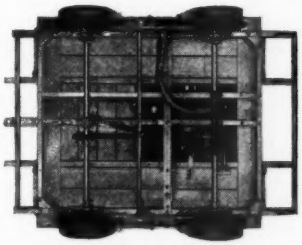
It's Built for Service!

So *sturdy* that it carries an 8-man gang with tools in complete safety—so *light* that one man can easily handle it—this is the Fairbanks-Morse No. 53 Motor Car.

It weighs only 930 lbs.; its rear end lifting weight is but 130 lbs. Chain driven, it is powered by a dependable 8- to 13-hp. motor.

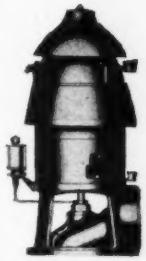
It offers proved reliability, serviceability, and operating economy—as do all motor cars in the complete Fairbanks-Morse line. Write for full particulars about the motor cars that are, and always will be, built for service.

Fairbanks, Morse & Co., Chicago 5, Ill.

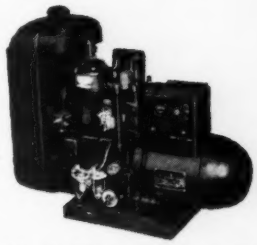


Under side of No. 53 Motor Car, showing transmission assembly.

Fairbanks-Morse Demountable-Hub Steel Wheels—for all motor car requirements.

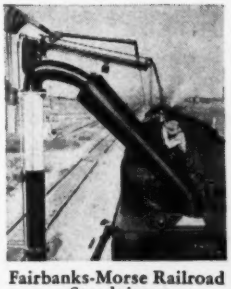


Fairbanks-Morse Pumps—a full line of complete pumping units for every need.



Fairbanks-Morse Generating Sets—one for every requirement.

Fairbanks-Morse Scales—Every type and capacity, including platform scales, pictured.



Fairbanks-Morse Railroad Standpipes.

Fairbanks-Morse

A name worth remembering

Diesel Locomotives • Magnetos Diesel Engines • Scales • Pumps Generators • Farm Equipment Motors • Stokers • Railroad Motor Cars and Standpipes

CLAY PIPE spells

SERVICE is assured when you use Clay Pipe. You can install any job with speed and . . .

EFFICIENCY because Clay Pipe comes in convenient lengths that one man can handle easily. Clay Pipe can be installed with a minimum of labor, and it has the . . .

RUGGEDNESS to stand up under difficult conditions. It is perfect for use where extra-heavy live or dead loads are encountered, and gives . . .

VALUE because it never wears out! Clay Pipe's durability is insurance against replacement or repair. This is due to its . . .

INERTNESS to gases, acids, alkalies, rust and corrosion. Clay Pipe is made of nature's raw material — indestructible clay — vitrified at fusing temperatures. It gives you the . . .

CONVENIENCE of a wide variety of fittings to meet conditions on any job. They make it easy to go over, around or under obstructions. The...

EXCELLENCE of your finished job with Clay Pipe will be such that you can be proud of your work and sure it will give long, trouble-free service!

DRY TRACK IN RAILROAD YARDS AND STATIONS IS ESSENTIAL. Vitrified Clay Pipe protects the investment in capital structures by assuring satisfactory removal of all storm waters . . . insures passenger convenience. Installed in roadbed drainage it is chemically resistant to the attack of cinder acids . . . withstands heavy loads and the vibration of modern high-speed trains.
If you need specific information on a Clay Pipe problem, write the details to the office nearest you.

National Clay Pipe Manufacturers, Inc.
703 Ninth and Hill Bldg., Los Angeles 15, Calif.
1105 Huntington Bank Bldg., Columbus 15, Ohio
522 First National Bank Bldg., Atlanta 3, Ga.
111 W. Washington St., Chicago 2, Ill.

C-1246-2B

CLAY PIPE NEVER WEARS OUT!

Now

WORLD'S LARGEST MOST POWERFUL TRACTOR

Allis-Chalmers HD-19

It's the most and Most — Built to Outproduce and Outlast!

COMPLETELY NEW... with HYDRAULIC TORQUE CONVERTER DRIVE

BUILT TO GET MORE WORK DONE

- Weight: 40,000 pounds.
- Power: 2-Cycle General Motors Diesel — 163 hp. at flywheel.
- Torque converter automatically balances load and speed without gear-shifting.
- Speeds: 0 to 3.0 in low gear and 0 to 7.0 in high; reverse, 0 to 5.5.
- More traction, more ground contact, better balance.

BUILT TO LAST LONGER WITH LESS UPKEEP

- Torque converter smooths tractor performance—cushions engine and transmission from shock loads.
- Simplified maintenance — major assemblies conveniently serviced or removed. Operating adjustments easily reached, quickly made.
- Reduced lubrication — greasing intervals lengthened throughout . . . 1,000 hours on truck wheels, support rollers, front idlers.
- High clearance—over 16 inches.

BUILT FOR EASIER CONTROL — GREATER OPERATOR COMFORT

- Torque converter eliminates most shifting.
- Hydraulic, finger-tip steering.
- Convenient controls.
- Self-energizing brakes.
- New type, adjustable split seat.
- Wide arm rests.
- Adjustable brake pedals.
- Full visibility.
- Comfortable foot rests.
- Clean platform.

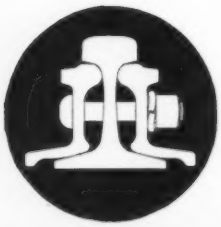
ALLIS-CHALMERS ... Originator of the Torque Converter Tractor

TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

RAIL JOINTS

HEADFREE JOINTS laid in 1929 in 130 RE track on one of our leading railroads were recently inspected. This 130 RE rail has carried to date approximately 300,000,000 gross tons. A report from this inspection states: "none of the joint bars at any of these locations are worn out or at present need reforming. We did not find a single joint where the rail ends were slapping or loose in the joint—where joint bars were removed they showed a head fillet contact for the entire length of the joint bar. As the joint bars still have a positive contact with the rail and considerable remaining take-up, we do not believe they should be disturbed."

IMPROVED HEADFREE JOINTS for new designs of rail have all features inherent in old design HEADFREE JOINTS, including GREATER STRENGTH IN THE HEAD, also the more recent improvement of the CURVED BASE and, in addition, GREATER HEAD BEARING due to increased head fillet in new TR and AREA rail designs. The results from these designs, we firmly believe, will surpass the outstanding service performed by the HEADFREE JOINTS, over 35,000,000 of which have been furnished to the big majority of the railroads in the United States and Canada.



THE RAIL JOINT COMPANY Inc.
50 CHURCH ST. NEW YORK 7, N. Y.

"I'm a Roadmaster— and DUFF-NORTON

JACKS are *Standard* on my Division"

"And Here's Why!

"Railroad track jacks get a lot of rough, hard usage. They have to be tough to take that fast tripping when a train comes through. Many a time I've seen Duff-Norton Jacks withstand the strain of raising 200 miles of track without a single failure. Their easy operation and long service life keeps my gang moving along at a fast pace. Snow and rain hardly affects them. They're easy to maintain and repair, too, as most of them have interchangeable parts."

Thanks Mr. Roadmaster!

Duff-Norton Jacks have been giving road crews such as yours the same dependable service for many years. We know how keen you are about the surface you put on a rail, and we build the jacks that enable you to do the job with satisfaction and efficiency. That's why so many Roadmasters always specify Duff-Norton track jacks.

DUFF-NORTON TRACK JACKS

Favorites for:

- *Economy*
- *Efficiency*
- *Easy Operation*

Here are the Duff-Norton Jacks you should have to enable your gang to do a safe, fast and efficient job.

No. 117 Single Acting Jack
No. 217 Single Acting Jack
No. 617 Single Acting Jack
No. 1-D Double Acting Jack
No. 304 Side Lift Jack
No. 617 Surface and Lining Jack

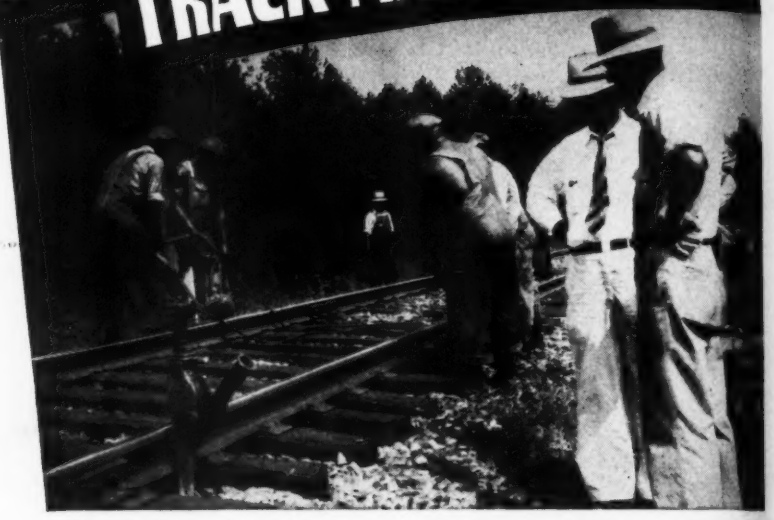
Write today for complete data and prices on these dependable Track Jacks.

DUFF-NORTON JACKS ESTABLISHED 1883

The DUFF-NORTON Manufacturing Co.

Pittsburgh, Pennsylvania

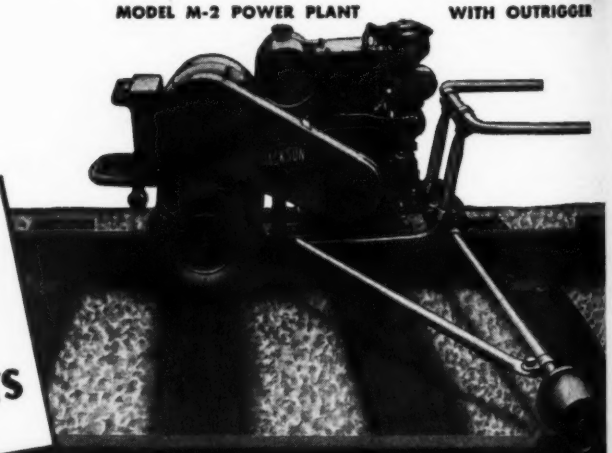
Take this SHORT CUT TO LOWEST-COST TRACK MAINTENANCE



The standard Jackson 4-tamper plant used by the normal section gang can be grouped to great advantage in extra gang service whenever new rail is laid or a major lift is necessary, returned to the sections when the big job is done.

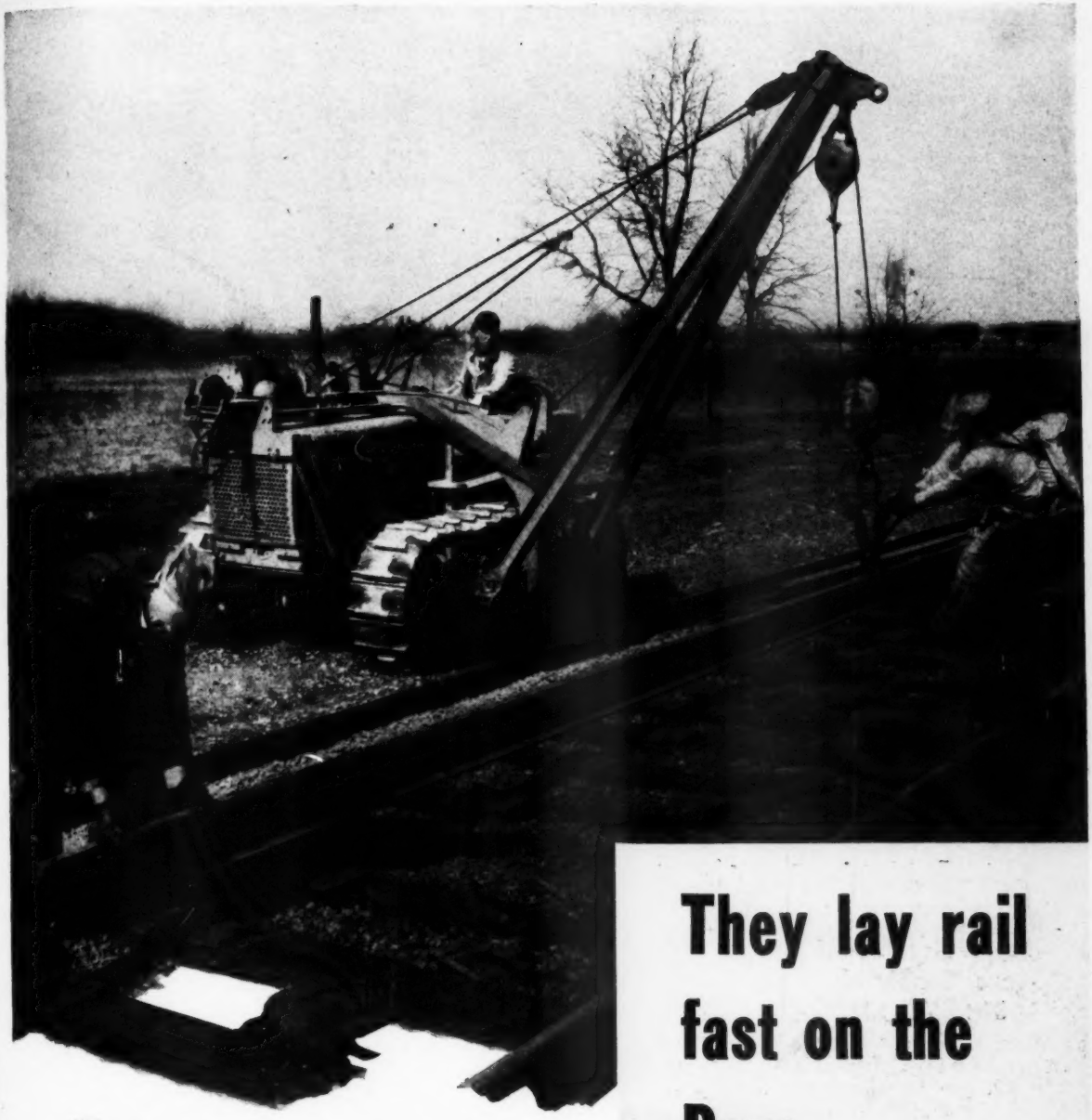
Just drop us a line signifying that you would like to have the **JACKSON** Field Engineer in your district drop in on you. He is a thoroughly experienced maintenance man and can demonstrate on your own track and to your entire satisfaction that **JACKSON** Tie Tampers and **JACKSON** methods — which represent the best practices of leading roads — will give you more track of better and longer lasting quality per dollar invested than can be accomplished by any other means. And bear in mind that **JACKSON** Tampers are just as superior on "Spot Tamping" as they are in all general surfacing and new ballast insertion. You buy only on sound, proved, demonstrable facts and avoid the costly experimentation others have gone through before ultimately standardizing on **JACKSON** equipment. Why not drop us a line right **NOW?**

MODEL M-2 POWER PLANT WITH OUTRIGGER



JACKSON *Tie Tampers* and **POWER PLANTS**

ELECTRIC TAMPER & EQUIPMENT CO. Ludington, Mich.



They lay rail fast on the Pere Marquette

"Caterpillar" Diesels have so many uses in modern maintenance of way that it's hard to keep up with them.

Teamed up with such equipment as scrapers, bulldozers, post-hole diggers, shovels, compressors and winches, they've built a solid reputation for fast, efficient work. But nothing better illustrates their versatility than the things they can do with a side-boom.

Working on the Pere Marquette Railroad, near Howell, Michigan, this "Caterpillar" Diesel D4 Tractor, equipped with a Trackson Side-boom, lifts heavy rail like so much matchwood and places it right where it's wanted.

Broad tracks, low center of gravity and plenty of rugged power make the "Caterpillar" Diesel a handy, fast-working tool for this and other tough maintenance jobs.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

CATERPILLAR
REG. U. S. PAT. OFF.
DIESEL ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT

PITTSBURGH PIPE CLEANING

For Water, Steam & Fuel Supply Lines 3" to 72" I.D.

Specialized equipment, employing hydraulic and mechanical methods, together with the "know-how" gained from thousands of tough pipe cleaning jobs, is your assurance that water supply lines can be THOROUGHLY cleaned! All incrustation, tuberculation and LARGE OBJECTS lodged in lines are removed to restore water systems to top capacity. Think of what this means in reduced pumping pressure, lower pumping costs, faster water servicing and increased fire protection: It pays to have pipes cleaned the Pittsburgh way!

PITTSBURGH SEWER CLEANING

For Sewers and Disposal Lines 8" to 10 ft. I.D.

Good drainage is a prerequisite of good track and efficient yard maintenance. That is why so many railroads rely on Pittsburgh Sewer Cleaning Service to keep their drainage systems at top capacity. Pittsburgh's experts have the specialized equipment and technical knowledge to take care of your toughest sewer cleaning problems . . . at minimum cost and without delay. A floor or a freshet may occur tomorrow. Make certain that your drainage system can take care of it TODAY!

PITTSBURGH ERIC PROCESS

Pipe Lining for Water Mains 3" to 24" I.D.

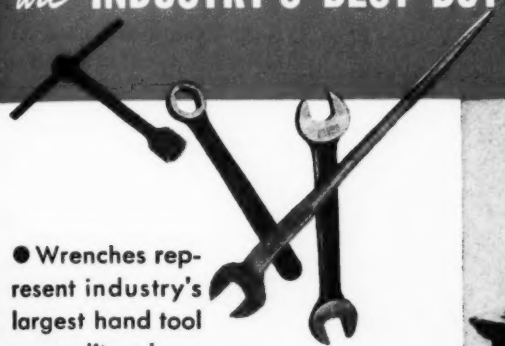
Specify Pittsburgh-Eric Process on your next pipe cleaning job! After thorough cleaning, the pipe is lined with LECTUMEN which imparts a smooth, long-lasting trouble-proof coating to steel and C.I. water mains. LECTUMEN not only protects the pipe from underlying deterioration, but resists the accumulation of organic deposit within the main. The result is many additional years of service from existing mains at a fraction of the cost of replacement.

PITTSBURGH PIPE CLEANER COMPANY

133 Dahlem St., Pittsburgh 6, Pa.

PHILADELPHIA · BALTIMORE · WASHINGTON · NEW YORK · BUFFALO · CHICAGO · CINCINNATI · ST. LOUIS · DETROIT · BOSTON

WILLIAMS "Superior"
CARBON STEEL WRENCHES
are INDUSTRY'S BEST BUY

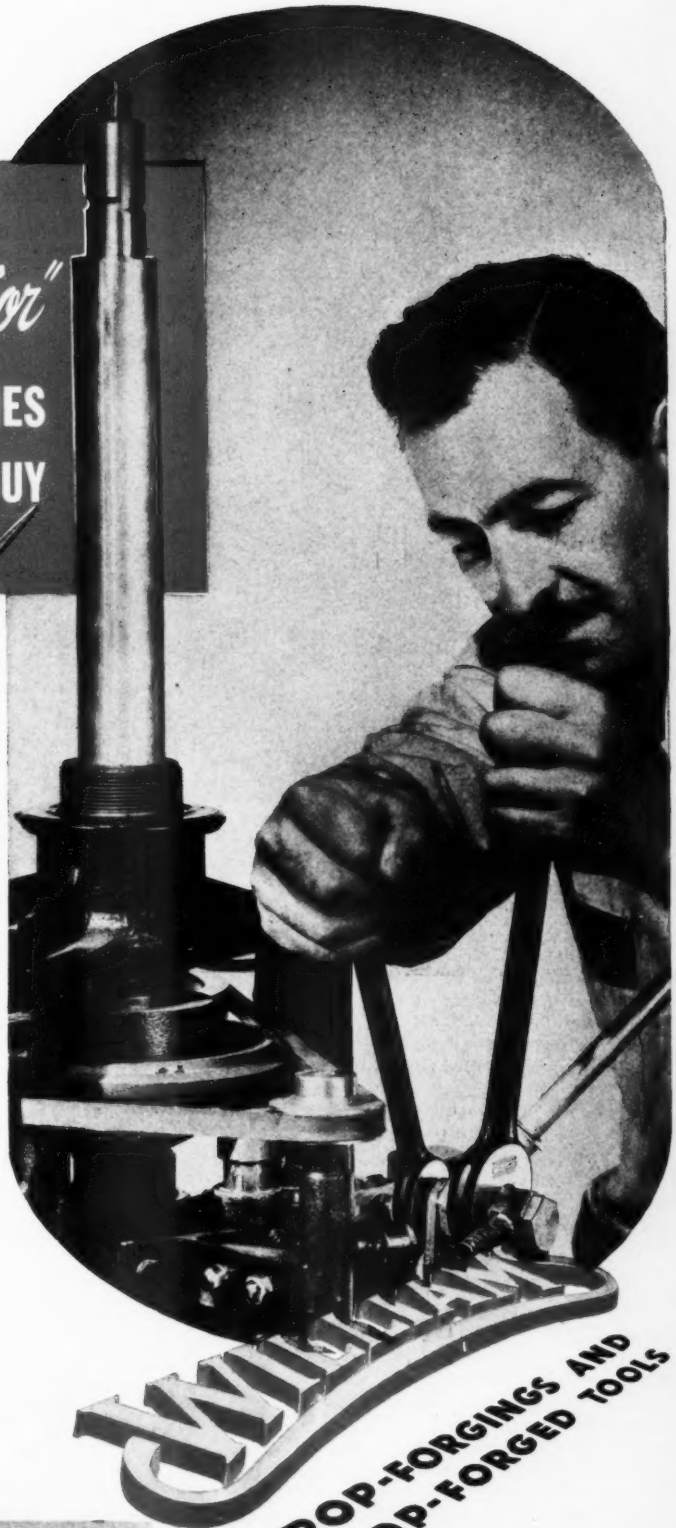


● Wrenches represent industry's largest hand tool expenditure!

Williams "Superior" Carbon Steel Wrenches represent industry's best "buy" because they deliver more wrench value per dollar. Drop-forged from a selected grade of carbon steel and specially processed, "Superiors" have twice the strength of old-style carbon wrenches. They cost approximately half as much as alloy steel wrenches, and average 93% as strong, pattern for pattern and size for size.

Available in 50 patterns, more than 1,000 sizes. Sold by leading Industrial Distributors everywhere.

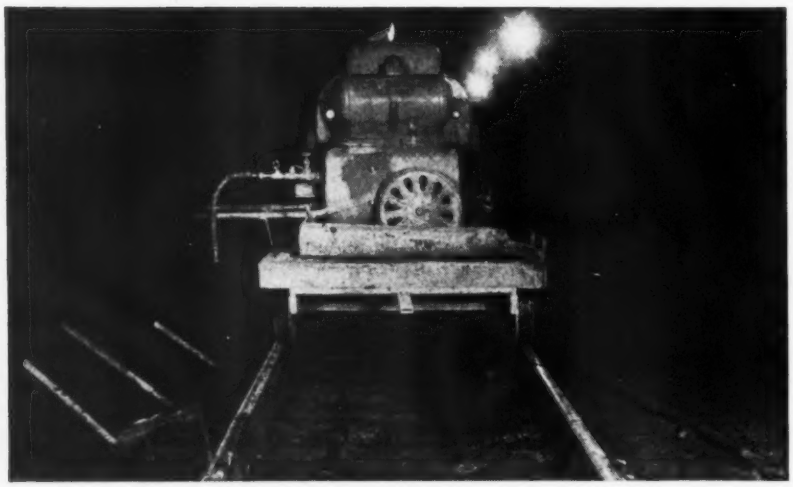
J. H. WILLIAMS & CO., BUFFALO 7, N. Y.



DROP-FORGINGS AND DROP-FORGED TOOLS

Pressure Grouting Stabilizes Tunnel Subgrade

Operation reduces track maintenance and permits Spokane, Portland & Seattle Railroad to remove 10 m. p. h. slow orders of 35 years standing.



A grout injector of ¼-cu. yd. capacity, mounted on a push-car, injected the grout pneumatically at 90 p. s. i. pressure.

Portland cement grout pumped under pressure into the wet subgrade of the Fort Wright Tunnel on the Spokane, Portland & Seattle Railroad, near Spokane, Wash., has stabilized the soft subgrade and permitted the railroad to remove slow orders of 35-years standing.

Since shortly after the tunnel was completed in 1910, the watery subgrade has caused operating problems, high maintenance and slow orders. Train speeds were limited to 10 m.p.h.

Now for the first time in 35 years trains are operating through the tunnel at normal speeds and track maintenance on the 2,134 ft. length of the tunnel has been greatly reduced.

Quicksand and Clay

Most of the Fort Wright Tunnel is on a 3-degree curve. The bore was driven through quicksand, clay and "rotten" rock. Considerable water was encountered during the boring operations.

Shortly after the tunnel was opened, soft spots developed and bulges of clayey materials, quicksand and water pushed up through the ballast every time a train passed. At times water covered the ties. This condition required constant efforts of section crews to remove muck from the drainage ditches and maintenance cost was extremely high.

After investigation of track grouting operations on several other railroads, S. P. & S. engineers decided to try pressure grouting in the Fort Wright Tunnel.

In January 1945, work was started under the direction of E. B. Stanton, maintenance-of-way engineer. N. S. Westergard, roadmaster at Pasco, was in direct charge of the work in the field.

Beginning at the west portal, the track was grouted throughout the full length of the tunnel and more than 200 ft. beyond the east portal, a total distance of 2,350 ft. The job was completed in 70 days. The work was done under force account by Clifton & Applegate, general contractors.

Throughout most of the work the grout injection pipes were driven at every second tie. The mixture used consisted of 6 parts portland cement, 3 parts blow sand, 1 part diatomaceous earth and 10 parts water.

A grout injector of ¼-cu. yd. capacity, mounted on a pushcar, injected the grout pneumatically at a pressure of 90 p. s. i. (Grouting technique is described in detail in "Stabilizing Railroad Track by Pressure Grouting", published by the Portland Cement Association.

Quantities Varied

Total quantities of materials used indicated that an average of a ¼-yd. batch was used for every two injection points. Quantities per grout point varied, however, from as little as one ¼-yd. batch for four or five pipes to as much as five batches for a single pipe.

After the grouting was completed the foul ballast and dry mud were replaced with new ballast, bringing the track to proper grade and alignment. It has since remained stable under normal train speeds.

• • • • • • •

More than 45 major railroads are using pressure grouting with portland cement to eliminate water pockets or soft spots and increase the load-carrying capacity of troublesome subgrades.

In nearly every instance where pressure grouting has been tried, the entire cost has been returned within a few months by savings in maintenance.

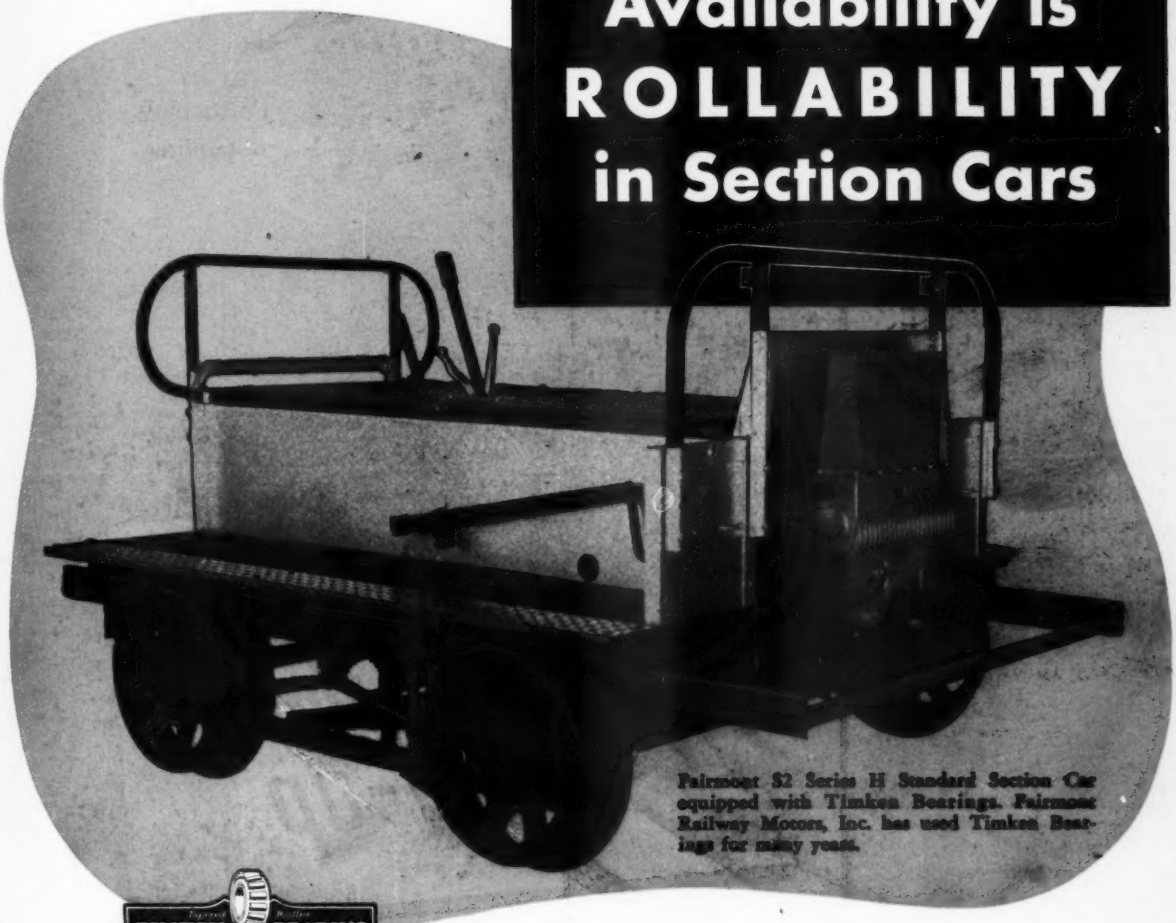
PORTLAND CEMENT ASSOCIATION

Dept. A10-27, 33 W. Grand Ave., Chicago 10, Ill.

A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work.

In grouting the Fort Wright Tunnel, injection pipes were driven at every second tie, at an angle so that bottom of pipe was about under the rail.
(Photographs and factual data courtesy Western Construction News)

Availability is ROLLABILITY in Section Cars



Fairmont S2 Series H Standard Section Car equipped with Timken Bearings. Fairmont Railway Motors, Inc. has used Timken Bearings for many years.

TIMKEN BEARING EQUIPPED

When bearings stop bearing, wheels stop turning, cars stop rolling. Give your cars maximum rollability with Timken Tapered Roller Bearings and they'll have maximum availability — and that's the quality needed most in section cars of all types.

Timken Bearings keep cars out of the repair shop by protecting the running gear against friction; radial, thrust and combined loads; and misalignment.

Wheel alignment is accurately maintained under all operating conditions. Axles last longer because they are not subject to wear. To get all these advantages, see that you get Timken Bearings in your new cars — with the trade-mark "TIMKEN" stamped on every cup and cone. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▱ BEARING TAKES RADIAL ◫ AND THRUST →◫← LOADS OR ANY COMBINATION →✳←

no "hold-up" with the "build-up"

You can build up rail ends without holding up rail traffic . . . with an Oliver "Cletrac" crawler tractor on your maintenance crew. Equipped with a welder, this versatile unit works off-track . . . does not interfere with rolling stock. And since the unit is easily moved along the right-of-way, it eliminates the need for long cables.

With a Cletrac on the job, expensive work trains can frequently be eliminated. With its various types of auxiliary equipment, it can be used for snow removal, tie tamping, ditch cutting and cleaning, grading, embankment building, and many other maintenance and construction tasks. Obsolescence is no problem with a Cletrac. Simply remove the outmoded welder, compressor, etc., and replace with a later model.

The sure-footed traction of Cletrac tractors permits them to climb over rails with ease . . . to operate efficiently on muddy or icy ground. To speed your maintenance work . . . investigate Oliver "Cletrac" crawler tractors for your jobs. The OLIVER Corporation, Industrial Division, 19300 Euclid Avenue, Cleveland 17, Ohio.

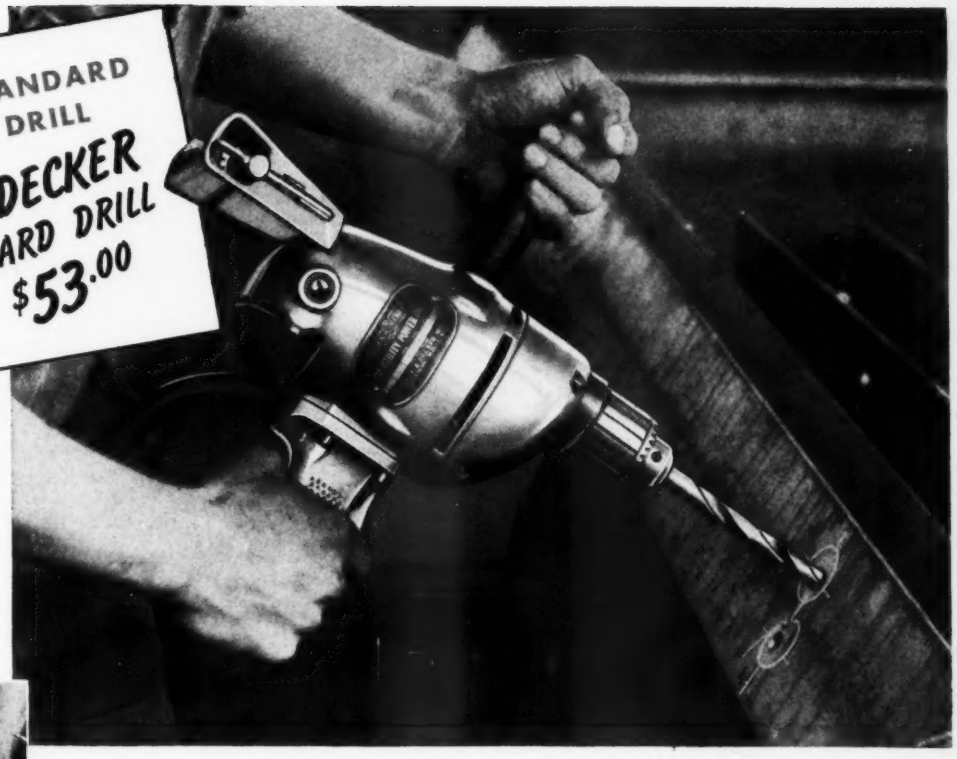
Cletrac

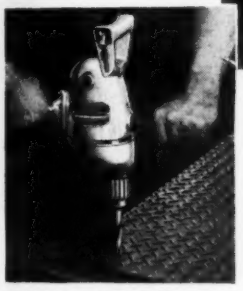
a product of The OLIVER Corporation

OLIVER
Cletrac
SALES
SERVICE

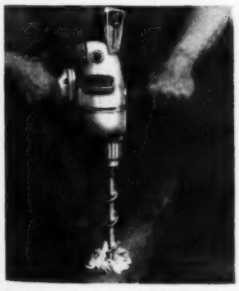
WORLD'S STANDARD ELECTRIC DRILL

BLACK & DECKER 1/2" STANDARD DRILL $53.00





DRIVES TWIST DRILLS up to 1/2" diam. in steel



DRIVES WOOD AUGERS up to 1" diam. in hardwood

DRIVES HOLE SAWS up to 3 1/2" diam. in sheet steel

Saves You Time . . . Cuts Costs
The Right "All-Purpose" Drill

The pictures tell the story of why the Black & Decker 1/2" Standard Drill leads in popularity with electric tool users. The spindle speed is just right for all sorts of general purpose work in metal, hardwood, plastics, etc. . . . on maintenance, repair and construction jobs. Perfect operating balance, weighs only 9 3/4 lbs. Minimum spindle offset and horizontal spade handle designed for work in close quarters. And the tool is expertly built of first-quality materials to give years of service. Universal (A.C.-D.C.) motor; standard voltage, 110; also available for 32, 220 or 250 volts.

Ask your nearby Black & Decker Distributor to show you this most popular Drill of many uses. And remember, he's ready to give you expert help on any other tooling problem. For your free copy of our catalog, write to: The Black & Decker Mfg. Co., 663 Pennsylvania Avenue, Towson 4, Maryland.

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC TOOLS

MULTIPLY Your Drill's USEFULNESS with these ACCESSORIES

HOLE SAWS: Cut clean, round holes in any material a hack saw will cut; 5/8" to 4" diameters.

BENCH STANDS: Quickly convert your Portable Drill to drill press use for accurate and heavy-duty work.

RIGHT ANGLE ATTACHMENT: For drilling and boring around corners, in close clearances.

FEED SCREWS: A mechanical "push" for constant, steady feed pressure in close quarters.

FASTEST CUTTING, MOST RUGGEDLY BUILT CHAIN SAWS ever made

Close-to-ground felling

Bucking—top or inverted
Limbing at all angles

All kinds of timber cutting

...now at *new* LOW PRICES

DISSTON CHAIN SAW with Mercury Gasoline Engine

11 h.p., 2-cylinder engine. Sizes: 24" to 84"

For fast, dependable performance—in timber cutting of every kind—the Disston Chain Saw is outstanding. It's a portable, easy-to-operate, two-man, self-contained unit for use in forests and parks; on tree service, railroad and contracting work; at shipyards and manufacturing plants—wherever there are trees to fell and buck or timbers to cut.

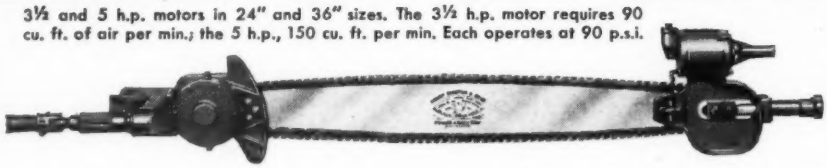
The Disston Chain Saw is built for long, hard service and low cost operation. It delivers more horsepower per pound of weight, and is manually controlled to utilize full engine power under all cutting conditions.

Among its many outstanding features are the two cylinder, 11 h.p. engine; positive-acting, non-slip, multiple-disc clutch; the detachable air cleaner; and the tough, durable cutting chain of Disston Steel. It's a product of Disston saw making skill and dependability . . . a typical example of the economy of Disston quality.

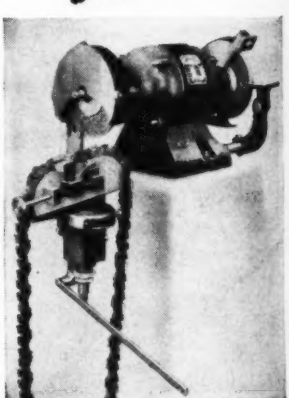
IMMEDIATE DELIVERIES

DISSTON CHAIN SAW—*PNEUMATIC*

3½ and 5 h.p. motors in 24" and 36" sizes. The 3½ h.p. motor requires 90 cu. ft. of air per min.; the 5 h.p., 150 cu. ft. per min. Each operates at 90 p.s.i.



A powerful, light weight, air-driven saw that can be operated wherever compressed air is available—even under water or where explosive vapors are present. Many are in use by railroads, contractors, shipyards, utilities and industries of various kinds. It is ruggedly built, well balanced and easy to operate from any cutting position and on woods of every kind. Equipped with heavy-duty, vane-type motor, specially engineered and produced by Chicago Pneumatic Tool Company for use on Disston Chain Saws. Requires little maintenance as it is built for long, economical service.



DISSTON ELECTRIC CHAIN SAW SHARPENER

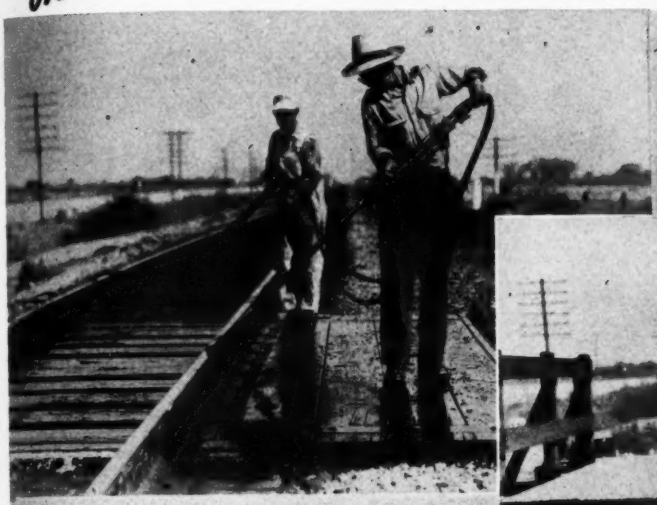
Enables you to do your own sharpening . . . quickly, easily, accurately. Keeps chains in first class condition.

Write for further particulars, or see your Disston Distributor

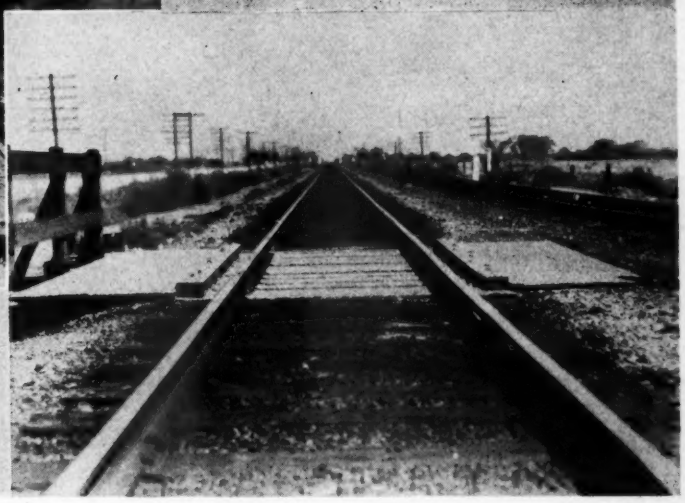
HENRY DISSTON & SONS, INC., 1041 Tacony, Philadelphia 35, Pa., U. S. A.

COMPLETE STOCKS OF PARTS AND QUICK SERVICE THROUGHOUT THE COUNTRY

Prevent fire hazards on bridges with the LIBBEY-ZONE PROCESS



⬅ Left: "Zone" Primer being applied between sidewalk and guard-rail under sixty pounds of pressure.



➡ Right: Same scene 45 minutes later, showing "Zone" Heavy-Duty Coating neatly laid and job completed.

From main line to shunting trestle, every open-deck timber bridge presents its own fire hazard. Brake shoe sparks, lighted cigarettes tossed by careless smokers, drippings of molten metal from overheated shoes, oil, coal, and other fuel dropped from locomotive boxes... all these elements find a hungry target in unprotected surfaces where ordinary coatings have worn down and cracked to expose splintered wood.

Leading Railroads* are now restricting fires with the LIBBEY-ZONE PROCESS using Heavy-Duty Coating... the revolutionary scientific discovery that combines genuine Canadian ASBESTOS FIBRE with intensified elastic ASPHALT GUM to produce a LONG-LASTING, ECONOMICAL, GENUINELY FIRE-RETARDANT SURFACE for open-deck bridges and trestles.

**Names of Railroads upon application*

"ZONE" HEAVY-DUTY COATING, when combined with the proper aggregate of crushed stone or gravel, expands with heat... yet does not melt; contracts with cold... yet does not flake! Laid thickly, the compound's resilient protective coating stretches over cracks and sinks into low spots, yet maintains an even spread and holds aggregate firmly in place when cold. "ZONE" HEAVY-DUTY COATING is easily and quickly applied and has nationwide distribution. Investigate the money-saving advantages of

ZONE *HEAVY DUTY COATING*

THE ZONE COMPANY

Division of

SOUTHWESTERN PETROLEUM CO., INC.

Fort Worth, Texas

ZONE *Heavy-Duty Coating... for fire retardant protection*

WITH LINK-BELT SPEEDER

Off the Track means On the Job!

Two views of Link-Belt Speeder LS-50 Crane with Dragline on C.B.&Q. right of way between Omaha and Lincoln, Nebraska.

NO INTERFERENCE BETWEEN MAINTENANCE AND TRAFFIC

With mobile, versatile Link-Belt Speeder off-the-track equipment, more work can be done in a given time; more kinds of work can be done with the same machine. And Link-Belt Speeders are noted for long life and trouble-free performance.

For prompt courteous efficient sales and service, there is a Link-Belt Speeder distributor located near you.

10,827

LINK-BELT SPEEDER

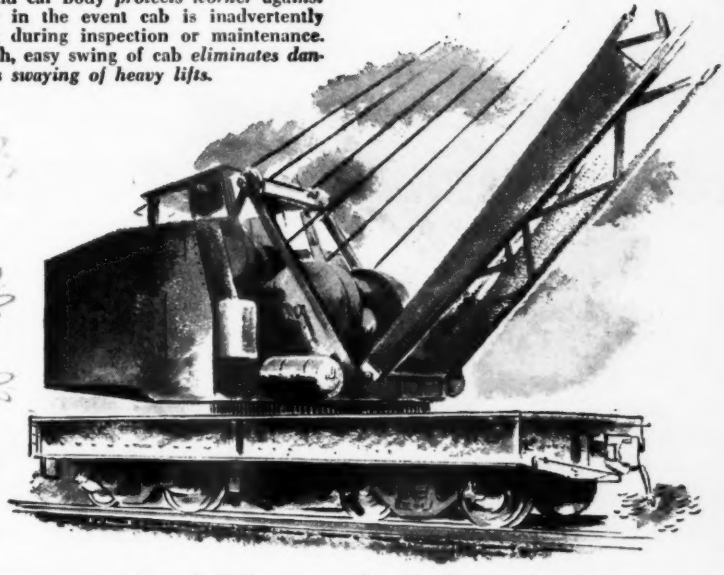
LINK-BELT SPEEDER CORPORATION, CEDAR RAPIDS, IOWA

Builders of the Most Complete Line of SHOVELS-CRANES-DRAGLINES

3 OF THE MANY REASONS WHY BROWNHOIST LOCOMOTIVE CRANES PAY OFF

ECONOMY! A large Mid-western steel mill operated a 25-ton Brownhoist Diesel crane four years. It worked 12,877 hours, consuming an *average of 1.88 gallons of fuel oil per hour.* Handling 710,175 tons of pig iron during this period, its down time for adjustments averaged 3.6 hours per month.

SAFETY! 14" clearance between rotating bed and car body *protects worker against injury* in the event cab is inadvertently swung during inspection or maintenance. Smooth, easy swing of cab *eliminates dangerous swaying of heavy lifts.*



VISIBILITY! The patented Monitor-type cab of the Brownhoist Diesel Locomotive Crane gives the operator an *unobstructed view in every direction*—360°. No awkward maneuvering, no hazardous guesswork—more efficiency, *more materials handled per hour*

From every standpoint—*economy, safety, visibility*—your best long-term investment in materials handling is a Brownhoist Diesel Locomotive Crane. Write today for *new, illustrated literature* giving complete specifications.

BROWNHOIST BUILDS BETTER CRANES

INDUSTRIAL BROWNHOIST CORPORATION • BAY CITY, MICHIGAN

DISTRICT OFFICES NEW YORK, PHILADELPHIA, CLEVELAND, CHICAGO • AGENCIES: DETROIT, BIRMINGHAM, HOUSTON, DENVER, LOS ANGELES, SAN FRANCISCO, SEATTLE, VANCOUVER, B. C., WINNIPEG, CANADIAN BROWNHOIST LTD., MONTREAL, QUEBEC.

Teamwork—

YOU'RE TALKING ABOUT A RAILROAD

Yes sir, it takes all kinds of teamwork to keep a railroad running on schedule. Each job, whether large or small, is an important part of the whole system. No small part of the splendid teamwork is the result of demanding and using the best possible equipment, especially the tools required for maintenance.

The TRACK, for instance, if not properly maintained, can spoil the rest of the teamwork. That's why most railroads use mechanical tamping, originated by Ingersoll-Rand. Most railroads use I-R air-operated MT-3 Tie Tampers—they are the lightest tampers available. The machine does the fatiguing work while the operator simply guides it.

Improve your teamwork and TRACK by using Ingersoll-Rand tie tampers and I-R off- and on-track air compressors.

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HOW *Weatherproofing* ADDS YEARS TO THE LIFE OF BUILDINGS

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TUNNELS

ROUNDHOUSES

ELEVATORS

The useful life of many railroad structures is shortened by neglect of natural deterioration and inattention to what might seem like unimportant physical damages. Crumbling mortar joints, water seepage, disintegrating masonry — all hasten the depreciation of a building, thus reducing its value as an income producing investment or a base for normal railroad operations.

You can stop such loss at its source, and add many years of use to stations, roundhouses, grain elevators, and other railroad properties through proper remedial restoration and protective maintenance. Years of experience in the solution of weatherproofing and waterproofing problems for many of the nation's leading railroads means that Western can add years to the life of your buildings. For only a fraction of a structure's value, decorative, and durable protection is guaranteed when you specify Western. Contact the nearest office without obligation, for a preliminary survey by an experienced Western engineer.

**Weatherproofing is the art of preserving buildings through an intelligent understanding of natural forces and the use of proper materials.*

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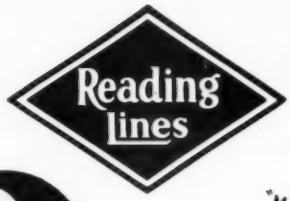
★ BOSTON
★ NEW YORK
★ CHICAGO

CENTRAL IRONITE WATERPROOFING COMPANY



IF YOUR SYMBOL IS MISSING

YOU ARE MISSING SOMETHING

Here are the symbols of twenty-six railroads that have installed oxy-acetylene pressure-welded rail. Jointless continuous rails in the trackage of these railroads range in length from 100 ft. to 12,780 ft. In twenty-five states throughout the country, this long rail is in high speed open track, on bridges, in tunnels and streets, and in other special locations. This oxy-acetylene pressure-welded rail has no joints—needs no joint maintenance.

Continuous rail has been produced and installed under OXWELD procedures since 1938 and is no longer considered experimental. Some of the nation's fastest trains, as well as the heaviest freight equipment, now glide smoothly over oxy-acetylene pressure-welded rail.

This is another OXWELD service developed as a result of working with American railroads for more than a third of a century. Write for the booklet "How Long Can A Rail Be."

THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
Carbide and Carbon Building Chicago and New York
In Canada:
Canadian Railroad Service Company, Limited, Toronto

SINCE 1912—THE COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS

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DULUTH MISSABE AND IRON RANGE
ILLINOIS CENTRAL
CHICAGO OUTER BELT LINE
N.C.&St.L.
CENTRAL OF GEORGIA
V&W RAILWAY
Santa Fe
Burlington Route
MISSOURI PACIFIC LINES
MONON
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SPEED and ECONOMY on Wheels!

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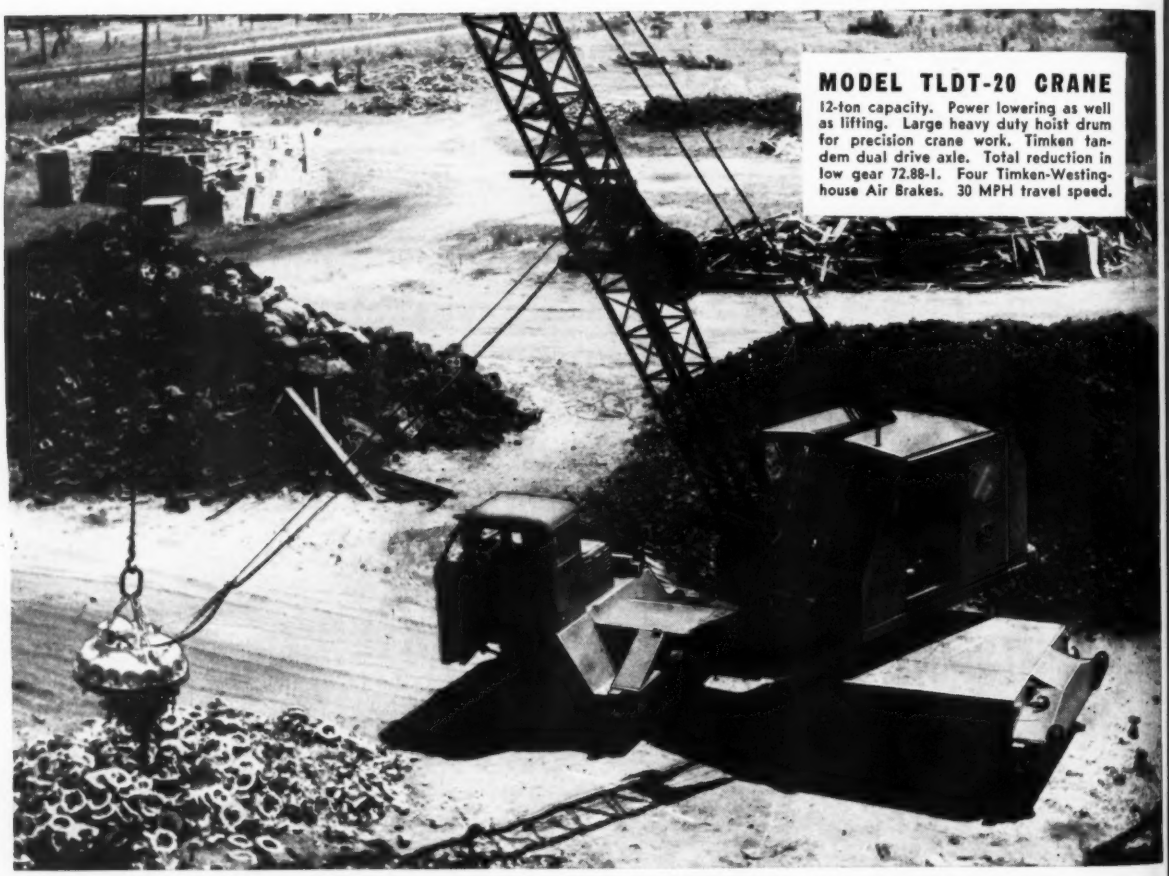
6 to 12 TON CRANES

No waiting—no delays! Out on the job or around the yard MICHIGAN Mobile CRANE'S time-saving, cost-cutting operating speed, economy and truck mobility pays off on every lifting and excavating job. Long-time MICHIGAN owners will tell you that for crane, clamshell, dragline, trench hoe and shovel work the fully convertible MICHIGAN Mobile SHOVEL-CRANE is truly "speed and economy on wheels"!

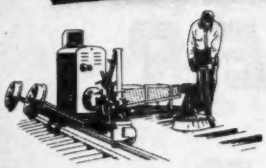


MODEL TLDT-20 CRANE
12-ton capacity. Power lowering as well as lifting. Large heavy duty hoist drum for precision crane work. Timken tandem dual drive axle. Total reduction in low gear 72.88-1. Four Timken-Westinghouse Air Brakes. 30 MPH travel speed.

MICHIGAN
POWER SHOVEL COMPANY
BENTON HARBOR, MICHIGAN

For additional information, use postcard, pages 1023-1024

These NORDBERG MACHINES were developed for your maintenance



ADZING MACHINE

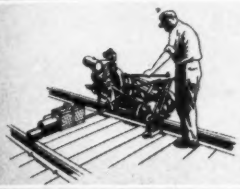
ADZING TIES

With every tie seat evenly surfaced and in the same plane, the Nordberg Adzing Machine is recognized as standard equipment on all rail laying gangs.

SPIKE PULLER

PULLING SPIKES

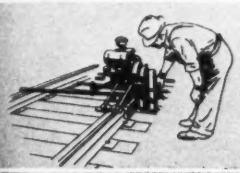
Faster removal of spikes speeds up rail laying and reduces cost of this operation as compared with hand pulling.



POWER WRENCH

TIGHTENING JOINTS

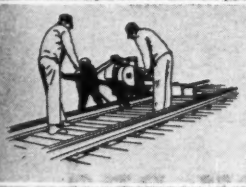
On rail laying jobs or periodical tightening, the Power Wrench tightens every track bolt with uniform tension. Accessories available for driving screw spikes and drilling rail.



RAIL DRILL

DRILLING RAIL

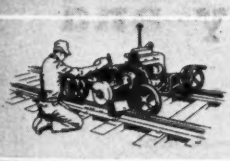
For all rail drilling jobs, this compact, simple, easily set-up Rail Drill is applicable for rail laying, working around yards, terminals, etc.



SPIKE HAMMER

DRIVING SPIKES

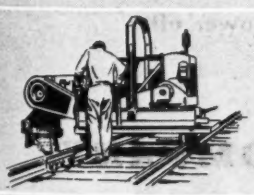
The Spike Hammer drives all spikes straight and vertical to the tie. The operator and two helpers will drive 800 spikes an hour, 400 on either side of the rail.



RAIL GRINDER

GRINDING RAIL

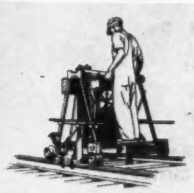
There are four types of Nordberg Rail Grinders, a machine for every grinding job on rail, switches, crossings, frogs, etc. These machines were developed to provide accuracy of work, speed and convenience of operation.



CRIBEX

CLEANING TIE CRIBS

The Cribex excavates foul ballast from the tie cribs and deposits it beyond the ends of the ties. Two Cribex in tandem will excavate from 50 to 100 cribs an hour.



POWER JACK

RAISING TRACK

This hydraulically operated Power Jack with its smooth, accurate lifts speeds up any ballasting and surfacing job where track must be raised. It will give better surface and alignment.

NORDBERG MFG. CO.
MILWAUKEE 7, WISCONSIN

"STEAD"

TRUE TEMPER

RAIL ANCHOR

Provides maximum economy and efficiency because of its . . .

Low initial application cost—Ease of application or removal—Adaptability to worn or corroded rail bases—Retains holding power after application—Long efficient Service.

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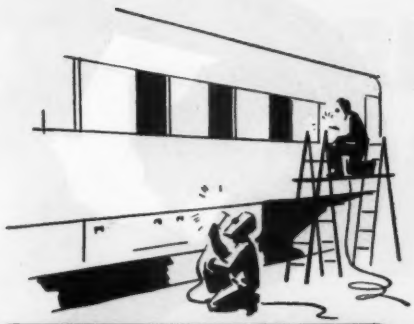
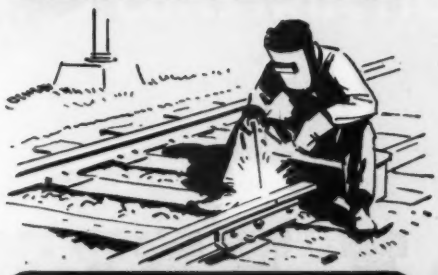
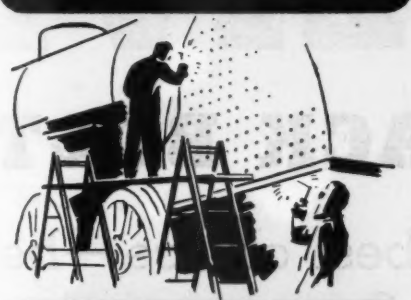


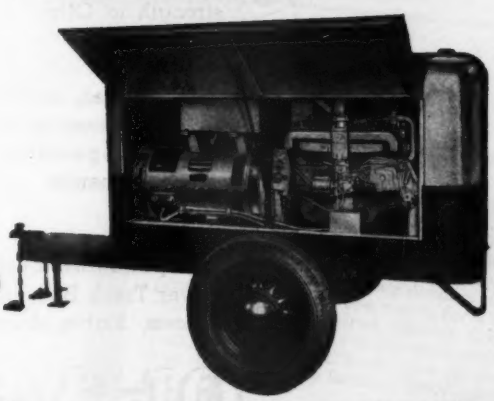
. . . FOR CAR BUILDING



. . . FOR MAINTENANCE OF WAY



. . . FOR SHOP REPAIR



The complete P&H line of arc welders includes models, AC or DC, for all shop and field requirements. Above is the P&H WN-300 2-wheel trailer welder. Available also as a 4-wheel trailer it is easier to move around, and provides a Welding Service Range of from 30 to 375 amperes. Write for Bulletin W-32-5.

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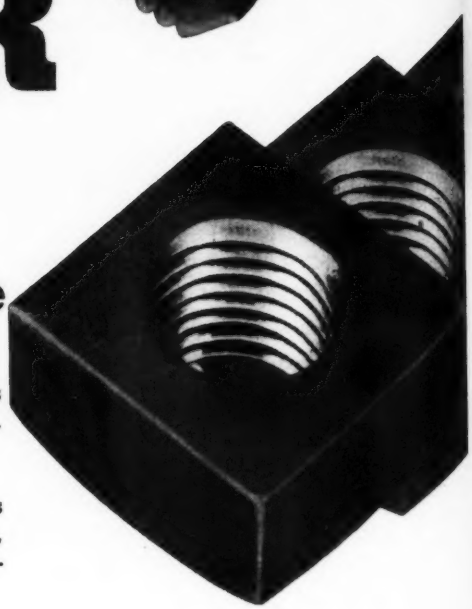
Double Heat Treatment adds strength to Oliver Track Bolts.

Clean, accurate threads mean faster assembly, speedier maintenance.

Dependable uniformity of Oliver Track Bolts means more uniform, higher strength joints.



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Another Outstanding HOMELITE Development—The New

One Man ELECTRIC CHAIN SAW

FOR BRIDGE BUILDING AND CONSTRUCTION

The Saw That Will Cut Your Costs

This is it... an amazingly light yet rugged, powerful and efficient chain saw that will save time and cut costs everytime it is used... a *one man* High Cycle Electric Driven Saw that will cut a 12 x 12 timber in 9 seconds flat, and has a capacity up to 3'.

With a Carryable Homelite High-Cycle Gasoline-Engine-Driven Generator as its power supply, you can use this 27 lb. chain saw *anywhere.* You can cut piling or heavy timber not only fast but right where construction and repairs are being done. Simple to operate, this saw makes cutting ... on all cuts, all positions... much easier. Its unique pivot action takes the strain off the operator. And there are no fumes or engine heat and vibration to cause fatigue. It is simple in design, sturdy in construction... sure to give you greater dependability and lower maintenance costs.

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Don't forget this *most important point.* The Homelite Carryable Generator that you use to operate your Homelite One-Man Chain Saw is an *All-Purpose* Generator. You can use it to operate high-cycle tools such as grinders, nut runners, impact wrenches. You can use it for 110-volt circular power saws, electric drills and many other standard universal power tools. And for night work, you can use it to operate several brilliant floodlights.

HOMELITE CORPORATION

CARRYABLE PUMPS • GENERATORS • BLOWERS

210 Riverdale Ave., PORT CHESTER, NEW YORK

No. 226 of a Series

Railway
Engineering and Maintenance
SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO 3, ILL.

Subject: Matters of Vital Interest

October 1, 1947

Dear Readers:

Railway Engineering and Maintenance is your trade publication, dedicated primarily to assisting you in the solution of your every-day work problems. As such, we, its editors, bring you from month to month feature articles, reports, addresses, discussions, descriptions of new products, and news related specifically to your work—and we shall continue to do so. But, convinced that all of this effort would be of little avail if the railway industry were to disintegrate due to economic and political causes—which is actually threatened—we continue each month to devote our lead editorial to a discussion of the major over-all problems of the industry in the hope of keeping you informed on these problems and enlisting your support in their solution. We urge your consideration of the thoughts presented in each of these editorials, as of vital importance to you and the railroads.

It is not our intent or purpose to alarm anyone unduly, and we want to avoid this. But nothing can be gained, and much harm done, by withholding the facts, or telling only the favorable half of the story. Whether you realize it or not, your industry is faced with serious economic problems. Not because there is any lack of demand for railway services, because, as you are well aware, that demand—for freight service—is at a peacetime high. These problems arise largely from earnings that are completely out of step with the sharply rising costs for labor, materials and supplies, resulting in restricted maintenance activities, curtailed programs of improvements in plant, equipment and services, and an increasingly serious financial situation that is depressing stockholders, discouraging the investment of much-needed new capital, and actually giving rise to the threat of government ownership and operation.

As vital to your full understanding and appreciation, all of these matters have been discussed in recent issues of Maintenance. In this issue we discuss "The Railway Dollar", pointing out the threat to the industry through the small amount that is available for interest on debts, rentals, improvements to property, and dividends for stockholders.

There is a crying need for you to know of these matters if you believe in the American system of free enterprise, and are interested in keeping the railroads in private hands. In view of this, it gives us considerable satisfaction that Railway Engineering and Maintenance, though essentially technical in character, affords you an opportunity —maybe your best opportunity—to keep informed on at least some of the basic facts involved.

Sincerely,

Neal D. Howard

NDH:jb

Editor

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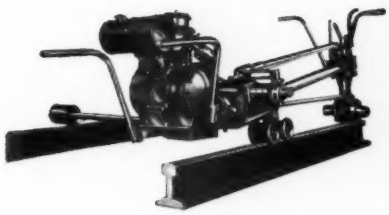
Great Power, Speed, Flexibility, Facility and Smoothness of Operation. Accurate automatic torque control. Quick switch from high to low gear. Full power lever for doing the impossible in removing rusted nuts.

Operating head has floating balance. All moving parts housed, except chucks.

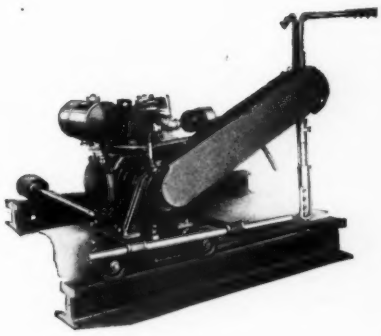


TIE BORER

Boring holes for cut spikes during rail laying gives so much better line of track that much of usual re-aligning is eliminated.

Boring proceeds as fast as spike driving.

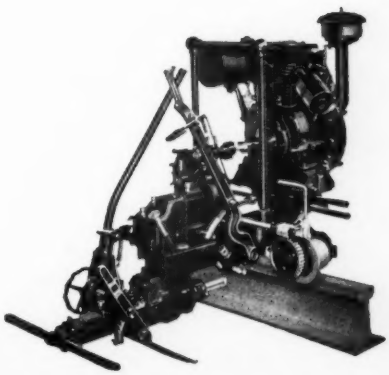
Spike setting requires half as many men.



M-W DRILL

Facility of operation is the fact that determines the value of a track drill. The Everett is complete with every necessary adjustment for rapid and accurate drilling.

The Everett can be clamped over splice bars, or to rail without bars. It will drill rail through splice bar holes. It can be used for drilling nearly all holes in switch layouts where minimum clearance is obtained.



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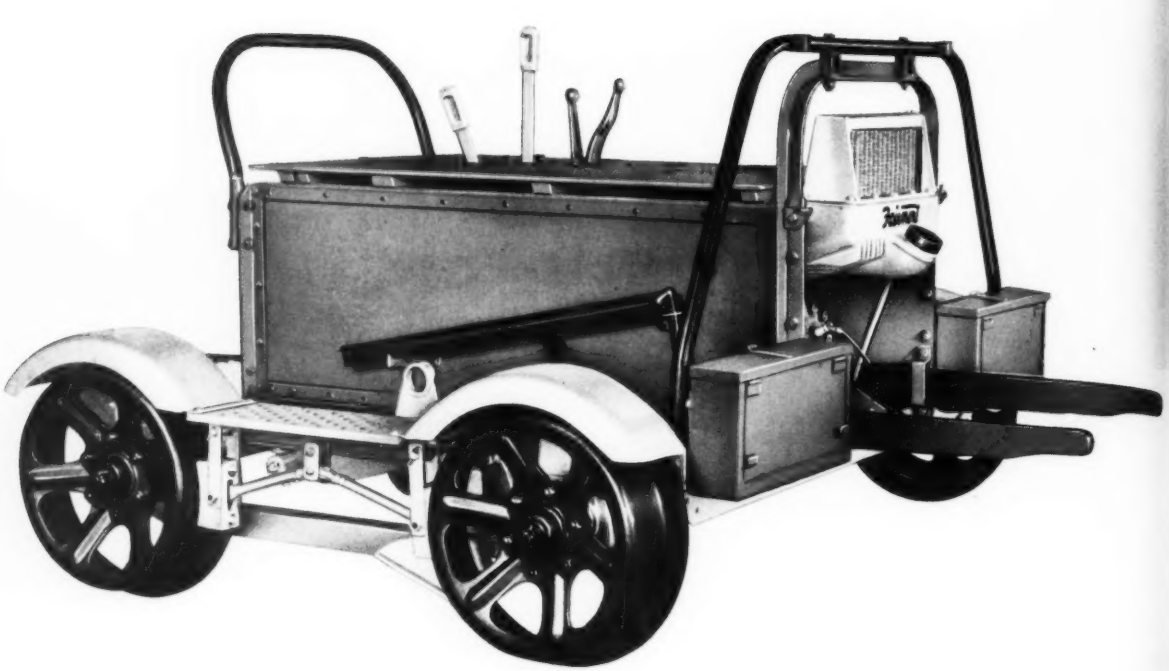

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Editorials - - -

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Railway Engineering and Maintenance

The Railway Dollar—

Small Return for Investors Threatens Industry

Too often the economic health of a large industry is measured by the huge size of its sales or gross revenues, with little or no consideration to its correspondingly huge operating costs, taxes and other expenses, thus setting up a completely erroneous picture as to its financial welfare, and, in many cases, creating an unfavorable attitude in the public mind toward its policies, prices and general relationship to society. It is making record sales, production is at a peak, revenues are at an all-time high—hence, it must be wallowing in money and the stockholders padding their pockets at the expense of the public and those employed in the industry.

Unfortunately, this is the attitude of too many toward the railways. They are carrying a record peace-time freight traffic; their production by every standard of measurement is at a peak; and their total annual operating revenues run into 10 figures. It is concluded, therefore, that they must be "sitting on top of the world"; somebody must be feathering his nest; requests for even reasonable increases in passenger and freight rates are unjust and exorbitant. How unfortunate and unfair such conclusions are in the light of what actually becomes of these "huge" revenues taken in by the railroads, and of the little that is left for those who have risked their savings in the enterprise—indeed, who make the industry possible at all under our American scheme of free enterprise.

In 1946, total operating revenues of the railways amounted to $7,627,000,000. Where did this money go? How was it spent? Of the total amount, 51.9 per cent, or approximately $3,958,413,000, was paid out in wages and salaries; 20.6 per cent, or approximately $1,571,162,000, went for materials and supplies; 8.1 per cent, or approximately $617,787,000, went for miscellaneous expenses; 6.5 per cent, or approximately $495,775,000, went for taxes; and 4.8 per cent, or approximately $366,096,000, was set aside for depreciation of the properties—leaving only 8.1 per cent, or about $618,000,000, to meet interest charges on debt, rent for leased roads and equipment, improvements, and dividends for stockholders. On the basis of their investment in the railroads, the stockholders, according to the Association of American Railroads, received an annual return last year—a year of the greatest peace-time traffic in history—of only 2.75 per cent.

Who will not say that this return, instead of being exorbitant, is little less than akin to ruinous in an economy where the railroads must compete for investors' money, for essential improvements in plant and equipment, with other public utilities that are currently earning in excess of 8 per cent, and with manufacturing concerns with earnings running as high as 40 per cent? And how far are these earnings of 2.75 per cent from what the public thinks they are and should be? In a public opinion survey conducted recently, a fourth of those questioned thought the railroads were earning a profit of 20 per cent or more, and all but 14 per cent of those queried thought the railroads were earning a return of over 6 per cent on their capital investment. Furthermore, the overwhelming majority of the American people considers 6 per cent a fair return for a public utility.

No wonder the railroad industry, with wages during the first half of the current year averaging 53 per cent higher than in 1939, and the cost of materials, supplies and fuel 60 per cent higher—and still rising—is calling on the Interstate Commerce Commission for relief in the form of higher freight rates. And these conditions have worsened by the further wage increase of 15½ cents an hour awarded to non-operating employees, effective September 1, which is estimated to increase annual costs to the industry by about $438,000,000. What will happen if the railways are not allowed the

increase in rates requested? This is a question that is being pondered by every road of the country, especially the 31 roads which failed to earn even interest and rentals during the first seven months.

With revenues for services rendered the only source of income to the roads, the only possible answer to their financial problems lies in an adequate increase in their freight rates. This increase the roads must have if they are to survive, throw off the threat of government ownership and operation, meet the needs of the country for constantly improved transportation services, and preserve themselves as the bulwark of the nation's transportation system in the event of another national emergency.

No person or institution in the country—the public, railway employees, business, or industry—should stand in the way of the rate increase being sought. To each of them efficient rail transportation is vital. Without such transportation—in peace or national emergency—only chaos can prevail.

Inflation—

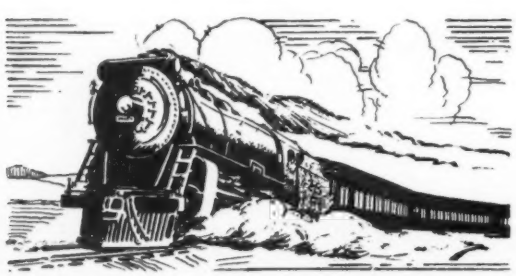
Its Meaning for the Maintenance Man

THE average maintenance of way supervisor or employee is apt to feel that inflation, except to the extent that it affects his personal affairs, is a subject for discussion only by the professors and economists. Actually, however, the inflation that is taking place in our economy today—as manifested by sharply higher prices for goods and services—is a matter that has very practical implications for those responsible for the economical upkeep of railway tracks and structures.

Under normal conditions, assuming relatively stable costs for labor and materials, each piece of railway property, such as a rail or a crosstie, is maintained in service until it reaches the end of its service life, with certain things being done from time to time (such as the building up of battered ends in the case of rails) to extend its life as much as possible. As long as it is safe to keep the particular piece of property in service, the cost of repairing or maintaining it is balanced against the cost of renewal, and the unit is renewed when the cost of making repairs becomes relatively excessive.

What happens, however, when the prices of particular parts, and the cost of inserting them, undergo sharp increases? It means, simply, that parts and facilities already in service are suddenly endowed with a greater value than they had before. Thus it becomes more than ever necessary to obtain the maximum service life from them, postponing as long as possible the time when they must be replaced at current high prices for material and labor. In fact, it is conceivable that in some cases it may be more economical, because of the high cost of renewal, to keep a piece of property in service beyond the point where renewal would normally be indicated.

Under any circumstances the responsibility of the man in the field is to do what he can to get the maximum service life from the property entrusted to him. Under the special conditions that prevail today this responsibility has assumed a new urgency which necessitates an intensification of effort in applying all the known methods for making property in service last as long as possible. Also indicated is an attitude of alertness in developing new or better ways of achieving the same end.



Slow Orders—

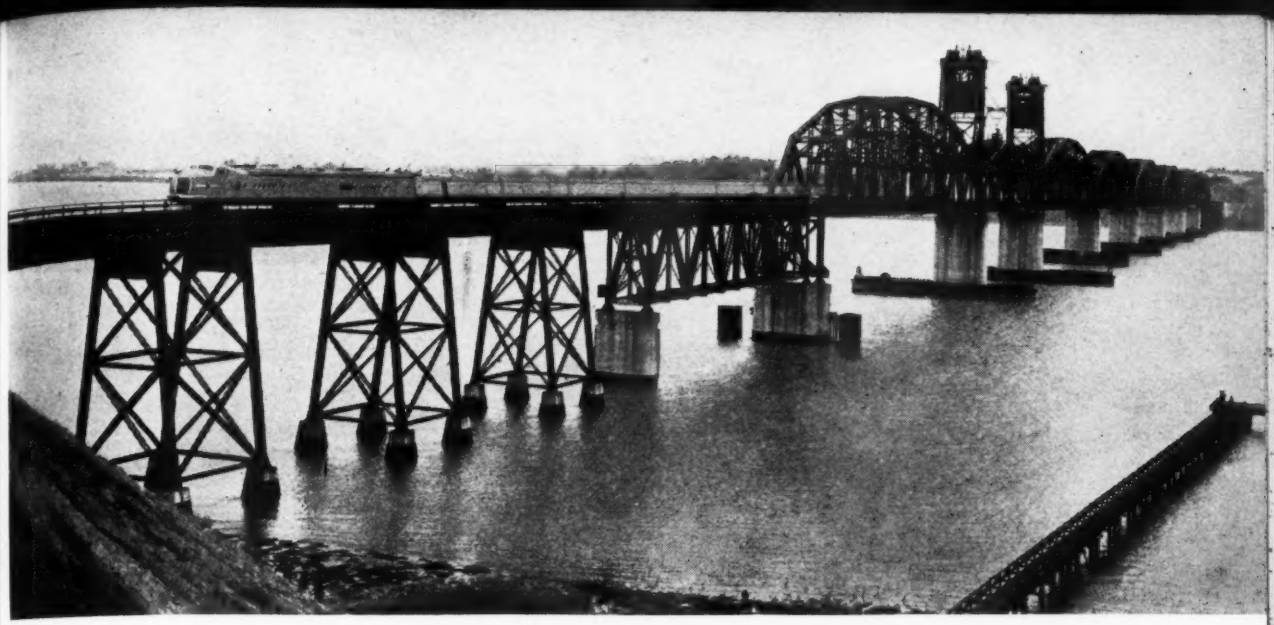
Why Do Some Remain in Effect So Long?

A STUDY of the operating timetables of the railroads in the country would reveal that speed restrictions are in effect at thousands of locations, and further analysis would show that a large number of these are imposed because of unsatisfactory or unstable roadbed conditions, often referred to as "sink holes" or "soft track." If this study were carried still further, it would become apparent that many of the slow orders due to roadbed conditions have remained in effect for many years, some, in fact, for longer than the memories of local employees can recall.

The cost of permitting these "permanent" slow orders to remain in effect for such extended periods is often tremendous. Such costs not only include the amount spent in repeatedly working the track at each location, but also the less tangible costs involved in slowing down innumerable trains and the still less tangible costs resulting from the loss of shippers' good will when, because of later arrival, freight trains miss connections at terminals.

In recent years several methods of roadbed stabilization have come into use. These include methods of subdrainage, the driving of poles along the track, and the currently more popular injection of portland cement grout into the subgrade at troublesome locations. A number of roads have made extensive use of these measures to the end that they have been able to eliminate slow orders at many locations. Encouraged by their success, these roads are continuing their stabilization programs on an ever-broadening scale.

On the other hand, some roads have shown little or no interest in these stabilization measures and continue to spend large sums for repeated resurfacing of track at sink holes and soft spots, and to incur the inevitable further losses from delayed train movements. With traffic at the highest level in history, with labor costs for all classes of employees at similar high levels, and with railway net earnings, on the contrary, running below the average for the last 10 years, it seems inconsistent that any road should continue out-moded and expensive practices at troublesome locations when effective "cures" are available for immediate application to correct them.



General View of the Southern Pacific's Long Double-Track Bridge Over Carquinez Strait

Ties Renewed on Large Bridge From *Underneath*

When it became necessary to renew the deck timbers on its long, double-track Suisun Bay bridge over Carquinez strait in California, the Southern Pacific Company, for traffic reasons, developed a method which permitted the work to be performed almost entirely from the underside of the bridge in the clear of traffic. As renewals were completed, the deck surface was given the Zone treatment of fire protection. This article describes the method and equipment employed in this work.

THE Southern Pacific Company recently completed tie and timber renewals on its 23-span Suisun Bay bridge over Carquinez strait in California, work which was done under traffic, in a novel manner, in large part from the underside of the bridge.

Suisun Bay bridge, which is one of the largest bridge structures on the Southern Pacific, is a double-track structure, 5,603½ ft. long, containing both steel deck and through-truss fixed spans, as well as a truss-type vertical lift span and a number of approach viaduct spans. More specifically, it includes seven through-truss spans, each 526 ft. long; one through-truss vertical-lift span, 328 ft. long; two deck-truss spans, 264 ft. and 504 ft. long, respectively; and two viaducts, one of which contains five 80-ft. clear spans and four 40-ft. tower spans, while the other is composed of two clear spans, 40 ft. and 100 ft., respectively, and two 40-ft. tower spans.

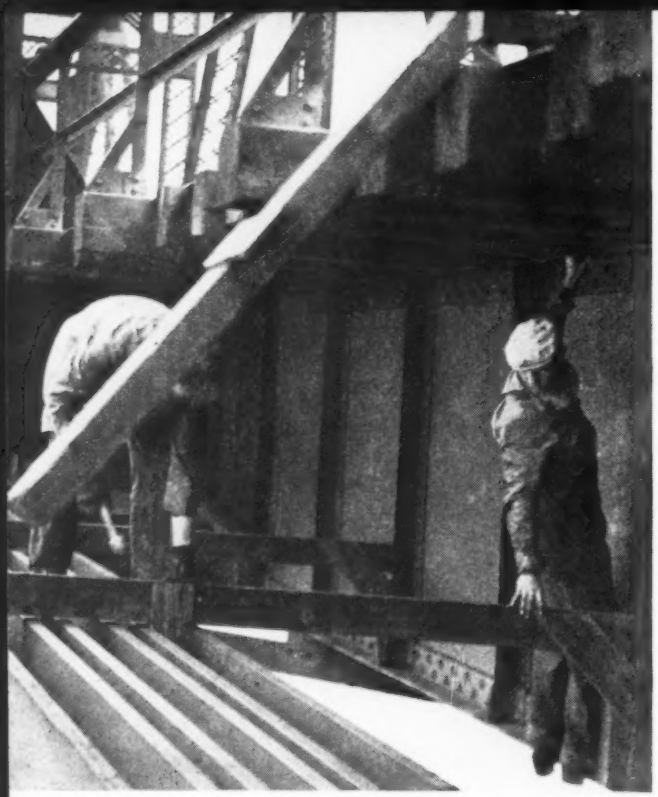
The fixed through truss spans have Warren-type trusses with pin-connected bottom chords composed of eye bars 14 in. wide and 1⅞ in. thick. The lift span differs from the other through-truss spans only in being riveted throughout.

The entire structure has an open-type floor composed of 10-in. by 10-in. ties, varying in length from 10 ft. to 19 ft. 3 in., depending upon their location. In the inter-track space and on both sides of the bridge are walkways with refuge platforms at specified intervals. The ties are anchored to the girders by hook bolts and are spaced with 5-in. by 8-in. guard timbers, lag bolted to the ties. The base of rail is 78 ft. above mean high water, which provides a minimum clearance of 70 ft. under the bridge at all fixed spans.

Plan of Work

The plan for renewing the deck called for the replacement of all timbers on the structure with new

Removing an Old Tie With the Aid of an Air Motor and Cable. Note Jacking Beam at the Left Holding Up the Rails



Left—Installing Supports for the Scaffolding, Which Extended Between the Eye-Bar Lower Chords and the Lower Flanges of Adjacent Stringers

Below—Installing a New Tie. Note the Hoisting Sheave and Cable Suspended Along the Bridge

timbers and for the replacement of the existing walkways, which were of plank, with checkered steel plates. This work was carried out under the following plan, which called for a framing yard on shore, equipped with the required framing tools and a hoist for loading the timbers; a barge and motor launch for delivery of the finished timbers to the site of the work; a special hoist for raising the timbers to the bridge deck; a special track-raising rig to permit the removal of the old ties and the insertion of the new; and the necessary auxiliary tools. Immediately prior to the start of the work, precise levels were run over the bridge to be used for the accurate framing of the new ties.

Framing Yard

In accordance with the prearranged plan, the framing yard was set up on the east bank of the strait, near the end of the bridge, where the barge and motor launch were anchored, and where electric saws and a hoisting winch were assembled, together with other necessary tools. Stocks of new ties, spacer blocks and guard timbers were delivered to the yard on railroad cars on an adjacent track and were kept well up in advance of the framing.

The ties were laid out in panels, one at a time, containing 36 ties for the intermediate panels and 38 for those panels located at the ends of the spans, and, using the information from the precise levels, were dapped to the required depth by means of an electrically-operated saw, equipped with a dado attachment. When each panel had been dapped and checked, spacer blocks, 5 in. by 9 in., two to a tie, were attached to the ties with 60d spikes and the ties were then individually numbered for their specific location on the structure. The completed panel was then loaded on the barge, one tie at a time, by means of a winch and cable loop operating through a sheave attached to the underside of one of the long deck spans adjacent to the framing yard. When three or four panels had been loaded, the barge was towed out under the bridge to the site of the work and was anchored to either the nearest piers or to the underside of the bridge.

Delivery to Truss Decks

Raising the framed ties from the barge to the decks of the through truss spans was done by means of a special hoist arrangement by men working on the bridge deck and on scaffolding below the track level. The hoisting equipment includes a cable strung along several truss members at a time, about 15 ft. above track level, to form a "dead man" for a sheave block and a hoisting cable. The hoisting cable was operated by a winch, powered by an air motor, located on the near walkway on the bridge. The motor received its air supply from a compressor, located on one of the refuge platforms, through a pipe line along the deck of the bridge.

Scaffolding

The attendant scaffolding was designed to be portable and was constructed between the lower flange of the outside deck stringers and the multiple eye-bar lower chords of the trusses. It was built of 4-in. by 4-in. timbers, 8 ft. long, on 6-ft. centers, solidly planked over with 2-in. by 8-in. and 2-in. by 10-in. planks. Since the lower flange of the stringers was 10 in. below the tops of the chords, the platform was leveled up by means of 10-in. legs of 4-in. by 4-in. timbers along the stringer side, braced at each leg with 1-in. by 6-in. boards.

Other Equipment

Special equipment was designed for raising the rails a sufficient height to permit removal of the old ties and the placing of the new ties without removing the joint bars, thereby saving considerable time in restoring the track for traffic. This equipment consisted of a 6-in. by 6-in. jacking timber about 6 ft. long, with an inverted U-shaped hook at each end. The hooks were suspended over the timber, and both legs of the hook were so bent as to engage the underside of the rail. In raising the track, the jacking timber was placed across the rails with the hooks gripping the rail and was then raised by two track jacks.

Air drills were supplied for the drilling of all holes in the timbers and impact wrenches were used for running the nuts in on the hook bolts. Miscellaneous timber tongs and hooks were also supplied for the work on the deck.

Procedure

In progressing the work, working on one track at a time over a specified distance, the first operation, after a day's supply of new ties had been hoisted from the barge to the scaffold, was to remove the walkways and guard timbers over a sufficient distance to provide for a full day's work. The walkway planks were removed with bars, while the old guard timbers were cut into 8-ft. lengths and split out. The second operation involved the pulling of the spikes from 15 to 20 ties and raising the rails from 3½ to 4 in. by means of the special jacking timber and jacks. At this point the ties, one at a time, were lifted out of the daps by means of timber hooks and were shifted laterally off the track about 3 ft. where, employing the special suspended sheave and cable arrangement, they were then hoisted out and placed on the scaffold. Using the same cable arrangement, the new ties, one at a time as the old ties were removed, were then raised from the scaffold and placed in proper position in the track. This procedure continued along the track continuously, except for traffic interruptions. At the close of the day's work the old timbers were loaded on the barge by means of the special cable hoist and were taken to the shore at the east end of the bridge for disposal.

Rails and Guard Timbers

As the work progressed, the rails were spiked to line and gage on the new ties and temporary guard timbers and walkways were placed along the new work, using 2-in. by 8-in. planks for guard timbers held in place with through bolts in every third tie and 20d spikes in the remaining ties.

The work of installing the permanent guard timbers and checkered plate walkways was carried on from 40 to 200 ft. behind the tie installations. The guard timbers were bolted through every third tie to the top flanges of the stringers with Lewis hook bolts. As an experiment, some of the hook bolts were equipped with an iron washer and either an Elastic Stop nut (type U) or an Ansco nut. The guard timbers were fastened to each intermediate tie by means of a ¾-in. lag screw 9 in. long.

Each of the walkways was 46 in. wide and was made up of 3/16-in. thick checkered plates, ranging in length from 9 ft. 5½ in. to 15 ft. 3¾ in. Each plate was fastened to the supporting timbers by ½-in. carriage bolts equipped with iron washers and nuts, the nuts in some cases being Elastic Stop nuts. In order to apply the center plates, staging was constructed between the flanges of the adjacent track stringers. The plates were stored at the west end of the bridge where they were painted on both sides with one coat of red lead and two coats of graphite paint prior to delivery to the work. They were then brought to the site of installation on push cars.

Installing Walkways

The work of installing the new ties, guard timbers and walkway plates on the lift span was similar to that on the other through trusses, except that here no side scaffolding was required, since handling of the old and new ties could be done from the broad built-up riveted bottom chords of the span. Likewise, the method employed on the deck spans differed only in the substitution of a portable timber A frame on the side of the deck for the suspended cable on the trusses, for supporting the hoisting cable and sheave arrangement for raising the ties from the barge to the deck.

The methods described in this article resulted in placing from 36 to 65 ties per 8-hour day with a force of approximately 18 men assigned as follows: five men in the framing yard, who also handled the delivery of ties via the barge; ten men renewing the ties; and three men following up with the guard timber and checkered plate installations. Where below-deck scaffolds were used in removing and placing the ties, two men usually worked on the scaffolds.

In order to maintain traffic during the work, with minimum delay to the work itself, a system of wayside telephone communication was used for advance notice of approaching trains, with 'phones both at the site of work and at both ends of the bridge connected with the dispatcher's line. This advance warning system, which extended as far as 15 mi. beyond the bridge in each direction, enabled the forces working on the bridge to restore the track for traffic in time to prevent delays.

Both tracks were completed as the work progressed, with the forces working ahead on one track for a specified distance and then dropping back to complete renewals in the second track before moving on.

Zone Treatment

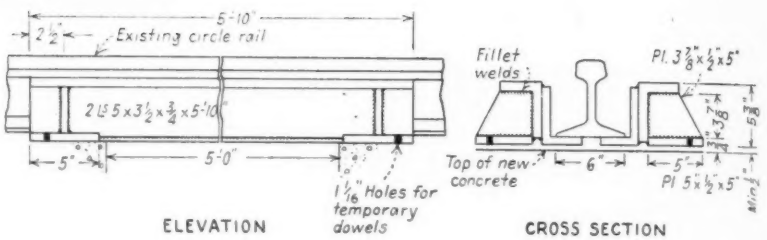
As each section of deck renewals was completed, the Zone treatment of fire protection was applied to the newly-installed timber. Briefly, this treatment, which was described in the May issue of *Railway Engineering and Maintenance*, page 482, consists of a coating of ⅛ to ¼-in. crushed stone on the tops of the ties, and tops and sides of all guard timbers, embedded in a special asphalt binder.

The work described was carried out under the general direction of E. E. Mayo, chief engineer of the Southern Pacific Lines, and J. P. Dunnagan, bridge engineer. Immediate supervision over the work was by the late Harry Crawford, bridge and building supervisor, assisted by Tom Cauthorn, assistant supervisor bridges and buildings.

A Portion of the Finished Deck, Showing One of the Checker-Plate Walkways in Place and Zone Treatment Applied to the Bridge Ties and Timbers

Failing Support Wa

The Chicago & North Western recently avoided the complete reconstruction of the failing circle-rail foundation of its 110-ft. turntable at Council Bluffs, Iowa, by repairing and enlarging the existing foundation, using a concrete slab extending from the face of the circle wall to a new inner concrete wall, on a pile foundation. By pouring the slab in alternate five-foot sections, the work was carried on progressively around the pit with but little interference to regular use of the table.



Above — Two Workmen Excavating Around the Inner Face of the Old Circle-Rail Supporting Wall Preparatory to Driving the Additional Support Piles Called for in the Repair Operations. Right — Elevation and Cross Section of the Temporary Circle-Rail Supports Used in the Operations

WHEN the existing mass-concrete slab supporting the circle rail of its 110 ft. twin-span turntable at Council Bluffs, Iowa, began to show signs of failure, the Chicago & North Western enlarged it on the inside and recapped it, under traffic, thereby restoring it to its full usefulness—and, incidentally, with only minor interference with the use of the table. This was done by driving timber piles along the inner face of the slab and then capping them with a new reinforced concrete ring wall, following which a new reinforced concrete slab was constructed over the old slab that had failed, after cutting away an 18-in. depth of the old mass concrete.

Built in 1929

The existing concrete rail-supporting slab was built in 1929 when the present 110-ft. turntable was installed to serve the 32-stall roundhouse at Council Bluffs. Late in 1944 the first evidence of its failure became apparent when settlement of the circle rail at the entering tracks occurred, and a vertical crack about one foot outside of the circle rail was found. This crack continued progressively along the circle rail and before the repair work had been fully completed the crack extended around the full circle. The mass-concrete slab supporting the circle wall and the circle rail was 8 ft. 6 in. wide and 5 ft. 6 in. thick. Its bottom was 10 ft. 1½ in. below base of turntable rail. The center of the circle rail was 1 ft. 10⅝ in. from the inside face of the slab, while the inner vertical face of the back wall was 5 ft. 3 in. from this face. The bearing soil beneath the slab is Missouri River silt, yielding when wet or uncompacted. No foundation piles were used in the original construction.

First Operation

In carrying out the work, the first operation was to excavate around the inner side of the existing slab preparatory to driving a single row of timber piles on a circle about 1 ft. 6 in. in from the face. In making this excavation, earlier falsework piles, driven at the time the wall was built, were encountered and were made usable for the new work either by driving them down to, or cutting them off at, a level one foot above the bottom of the old slab. Where these piles were more than three feet apart, additional piles were driven between them to form a continuous ring of piles inside the old circle-rail wall, with adjacent piles on centers of about 2 ft. 6 in. Average pile penetration below cut-off is 21 ft. 6 in.

With the piles in place, the next operation was to place a new reinforced concrete wall 2 ft. 9 in. wide and 4 ft. high on these piles. A construction key was formed in the top of this wall and the vertical reinforcement bars were extended above the top of the wall for anchorage into the new slab to support the circle rail.

Alternate Segments

Removal of the top 18 in. of the old circle rail support and replacing it with the new 18-in. reinforced concrete slab were carried out progressively in alternate 5-ft. sections around the wall, six such segments usually being worked on at one time. To remove each segment, the old circle-rail fastenings were first removed and then the old concrete was broken out with pneumatic concrete breakers. To give support to the circle rail over the gaps in the top of the old concrete, six special rail-support assemblies were furnished, making it possible to have six segments out at one time, without interfering with the operation of the table, and at the same time making it possible to pour six segments of the new reinforced concrete slab at one time.

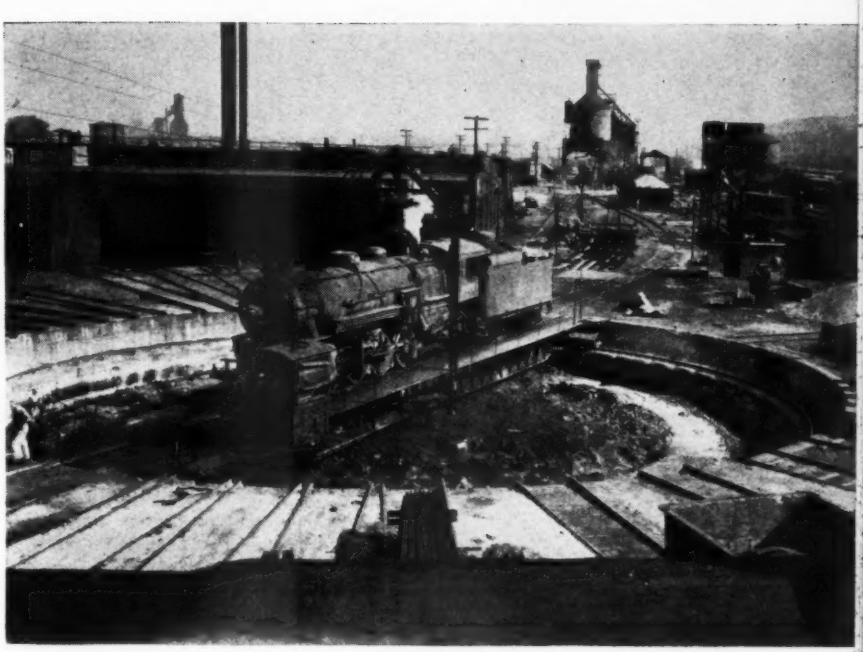
The supports consisted of an assembly of angles, welded together and reinforced, as shown in one of the accompanying drawings, which spanned the gaps cut in the concrete and were supported at their ends on the top surfaces of the adjacent undisturbed sections of the concrete. These supports, which left the space beneath

Wall for Turntable Circle Rail Is Repaired and Enlarged

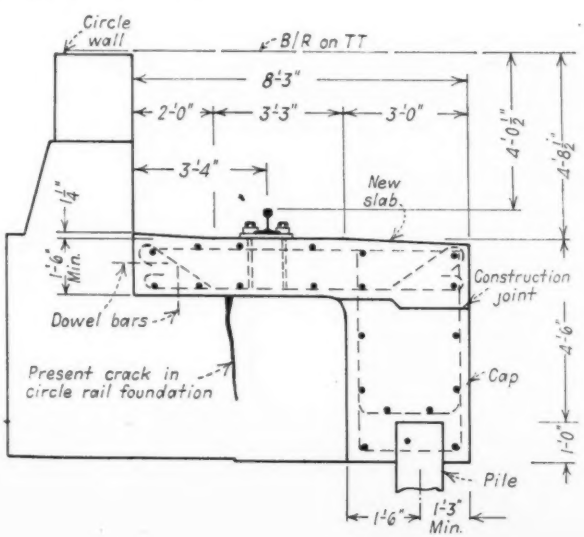
them unobstructed, were anchored to the supporting concrete at their ends by means of temporary steel dowels. Furthermore, temporary wood blocking was used along both sides of the rail, near the ends of the temporary supports, to overcome any tendency for the two longitudinal parts of the supports to tip toward the rail under the weight of the loaded table.

With six alternate segments of the old wall thus prepared, and the rail over these segments supported clear of the area beneath, the new segment slabs—extending from the inside face of the back wall to the inside top edge of the new circular wall—were poured. These were bonded to the old concrete below with one-inch dowel bars and to the keyed top of the new circular wall by means of the reinforcing bars extending up from the top of this wall, as mentioned previously. In pouring these new segments, new rail-anchorage assemblies were imbedded in the concrete along the center line of the circle rail on approximately 20-in. centers. At the same time the top surface of each segment slab was sloped to drain toward the pit, with the exception of an area 3 ft. 3 in. wide approximately centered under the rail seat.

With the completion of six such new slab segments, work was shifted to another section of the wall and the concrete was allowed to set for seven days before the temporary rail supports were removed. When these were taken out, the rail was permanently anchored in place to the new anchorage assemblies, employing steel filler plates, wedges, wedge clamps, bolts and rail clips. Details of these assemblies are shown in another of the accompanying drawings showing the work done on the turntable wall.



Above — View of 110-ft. Turntable at Council Bluffs, Ia., in Operation While the Repair Work Was Under Way. Below — Cross Section Through the Old, Failed Circle-Rail Support Slab, as Cut Down and Subsequently Enlarged and Strengthened



Minimum Interference

Thus, working on various sections of the wall under a definite program calculated to permit continuous use of the table, the old failing circle-rail support was repaired and enlarged with minimum interference with operations at the enginehouse. Plans for the work were made under the general direction of E. C. Vandenburgh, chief engineer, and A. E. Bechtelheimer, engineer of bridges, while the work itself was carried out by the bridge and building forces of the road under the immediate supervision of C. H. Wells, division engineer.

S. R. Hursh, Assistant Chief Engineer-Maintenance, Pennsylvania, Addressing the Roadmasters' Group. President Brown Listens

Roadmasters Study Pres... at Impressive Chi...

On September 16-18 the Roadmasters' and Maintenance of Way Association held its annual convention at the Stevens hotel, Chicago, meeting concurrently for the second consecutive year with the American Railway Bridge and Building Association. Attracting a large attendance, the Roadmasters' meeting was an outstanding success, with the program including the presentation of six technical committee reports and a number of addresses on pertinent subjects, several motion pictures, the annual banquet, and an interesting inspection trip. Also to be seen was a record exhibit of manufacturers' products.

THOSE attending the annual convention of the Roadmasters' and Maintenance of Way Association at the Stevens hotel, Chicago, on September 16-18 are almost certain to have come away with a renewed conception of the importance of the maintenance of way supervisor in the railroad picture today. It is equally certain that they took with them a stronger faith in the ability of these officers to solve the many complex problems facing them as the result, primarily, of higher costs of labor and materials. These conclusions seem valid in view of frequently reiterated comments made during the meeting by speakers and in committee reports, and because of the keen interest manifested in the proceedings by those present.

Concurrent with B. & B. Men

Not only was this convention one of the most outstanding ever held by the association, judging by the attendance, the constructive nature of the work accomplished and other standards of measurement, but it was highly unusual in that for the second consecutive year the meeting was held concurrently at the Stevens hotel with the annual convention of the American Railway Bridge and Building Association. While the two groups held their regular sessions in separate rooms, they were brought together on several occasions, including the opening session, to participate in programs of mutual interest. A measure of the success of the two meetings is given by the fact that they were attended by a total of 765 members and guests, as compared with 693 members and guests last year.

Contributing in an important way to the success of the meetings was the extensive joint exhibit of manufacturers products presented in the exhibit hall of the hotel, simultaneously with the conventions, by the Track Supply Association and the Bridge and Building Supply Men's Association. With 96 companies participating, as compared with 90 last year, this exhibit was the largest ever to be presented during conventions of either of the associations. A complete list of the exhibitors, including the representatives present and the products displayed, along with brief accounts of the annual meetings of the two supply groups, is presented elsewhere in this issue.

A detailed account of the activities of the Roadmasters' meeting and of the proceedings during the joint sessions is presented in these pages. A similar account of the activities of the Bridge and Building group will be presented in the November issue.

The two conventions were convened in a combined opening session on Tuesday morning, September 16, which was presided over jointly by E. J. Brown, engineer of track, Burlington Lines, and president of the Roadmasters' Association, and F. G. Campbell, chief engineer, Elgin,

The Opening Session of the Joint Conventions on Tuesday, September 16

Present-Day Problems Chicago Meeting

A. B. Chaney
First Vice-President

R. L. Fox
Second Vice-President

E. E. Crowley
Treasurer

E. J. Brown
President, Roadmasters' Association

Roadmasters' Association

Officers 1946-1947

E. J. Brown, president, engineer of track, Burlington Lines, Chicago.

A. B. Chaney, first vice-president, assistant engineer maintenance of way, M.P., St. Louis, Mo.

R. L. Fox, second vice-president, division engineer, Southern, Alexandria, Va.

Elise LaChance, secretary, Chicago.

E. E. Crowley, treasurer, roadmaster, D. & H., Albany, N.Y.

Directors

F. G. Campbell, chief engineer, E. J. & E., Joliet, Ill.

Neal D. Howard, editor, *Railway Engineering and Maintenance*, Chicago.

H. C. Koch, roadmaster, C. & W. I., Chicago.

A. G. Reese, district engineer maintenance of way, C. B. & Q., Galesburg, Ill.

C. Halverson, division roadmaster, G.N., Willmar, Minn.

J. E. Fanning, assistant to chief engineer, I.C., Chicago.

R. H. Gilkey, division engineer, C. of Ga., Savannah, Ga.

A. H. Whisler, assistant engineer, Penna., Philadelphia, Pa.

Joliet & Eastern, and president of the Bridge and Building Association. A joint session held on Wednesday afternoon was also presided over jointly by Mr. Brown and Mr. Campbell. The activities of all of the Roadmasters' sessions were directed by Mr. Brown, assisted by A. B. Chaney, assistant engineer maintenance of way, Missouri Pacific, and first vice-president of the Roadmasters' Association.

Greetings From Other Groups

The first part of the joint opening session was devoted to words of greeting from the American Railway Engineering Association by A. Chinn, president, Terminal Railroad Association of St. Louis, and president of the A.R.E.A.; from the Track Supply Association by H. M. McFarlane, president of that association; and from the Bridge & Building Supply Men's Association by W. L. McDaniel, president of that group. Lewis Thomas, secretary of the Track Supply Association and director of exhibits for the two supply groups, described the scope of the exhibition and invited all those present to attend it.

In his remarks Mr. Chinn drew a relationship between the A.R.E.A. on the one hand and the Roadmasters' and Bridge and Building Associations on the other, saying that "we are members of the same team—the team which for so many years has so ably handled the construction and maintenance work on our railroads." Developing a theme of cooperative effort between the three associations, he said that the A.R.E.A., as a rule, prepares the plans and standards, and that the members of the other two associations provide the "know how" required to put them into effect. "That is one of the reasons why," he said, "they can always figure some way to get their work done and done well. Another is their willingness to work and work hard; in other words to get out and do the job. That is indeed a fine trait, especially in these days when the general idea among most people seems to be to see how little they can do and still get by."

The closing feature of the joint opening session was an address by J. H. Aydelott, vice-president, operations and maintenance department, Association of American Railroads, after which the two groups separated to start their respective separate sessions.

President's Report

The opening session of the Roadmasters' meeting was prefaced by a statement by President Brown, which he emphasized was in the nature of a report rather than an address. He stated that, as the result of an aggressive membership campaign conducted during the year, more than 300 new members were accepted into the association, "perhaps the largest number ever recruited by any membership committee since the time the association started." He also spoke of the place of the association in furthering improvements that "will help the industry which we represent keep pace with the competition offered by other means of transportation," stating that it is the responsibility of present members of the association to maintain the high standards estab-

lished by their predecessors. He also dwelt on the value of membership in the association, and in this connection he quoted from a leaflet prepared by Mr. Chinn.

This leaflet states that the association gives every member three distinct opportunities that are valuable to him personally and through him to his company. These are as follows:

(1) Through committee work and discussion he is given an opportunity to develop his reputation for knowledge and ability, a reputation which is valuable to everyone.

(2) Through contact with a large group of men in the same kind of endeavor he has an opportunity to acquire new knowledge and new ideas which he can put to work for himself and his company.

(3) Through committee and association work he is given an opportunity to develop the qualities of leadership, so essential to success.

Committee Reports and Addresses

Following Mr. Brown's opening remarks the group plunged immediately into the work at hand, which consisted principally of the presentation and consideration of six technical committee reports and three addresses. The subjects of the committee reports were as follows: The Roadmaster's Responsibility in Controlling Maintenance of Way Costs; Methods of Increasing the Production of Extra Gangs; Advance Preparation of Track for Rail Renewals; Safety in Operation of Motor Cars and Work Equipment; Development and Training of Foremen; and Installation and Maintenance of High-Speed Turnouts.

Addresses on technical subjects were delivered by S. R. Hursh, assistant chief engineer—maintenance, Pennsylvania, who spoke on The Need for Increased Efficiency and Economy in Maintenance of Way Operations; by C. A. Rishell, director of research, National Lumber Manufacturers' Association, whose subject was Research to Reduce Mechanical Wear and End Splitting of Railroad Ties; and by R. B. Peck, research professor of soil mechanics, University of Illinois, who spoke on Roadbed and Embankment Stabilization.

The joint session of the two groups on Wednesday was featured by an address by Ralph Budd, president, Burlington Lines, on Problems of Railway Managements and How Our Groups Can Help. Afterward two motion pictures were exhibited before this session. One of these, entitled "Suggestions Unlimited," depicted the workings of the Illinois Central's employee suggestion system. The showing of this picture was prefaced by a statement by H. C. Marmaduke, representative, executive department, Illinois Central, who pointed out that, during the eight and one-half years this company's suggestion system has been in effect, a total of about 230,000 suggestions have been offered by employees, of which approximately 39,000 have been adopted. Cash awards to employees for these suggestions have amounted to a total of $476,000. He went on to tell how the system is administered and to describe the means used to maintain interest in it at a high pitch.

Other Motion Pictures

The other moving picture presented during the joint session on Wednesday was entitled "Maintenance of Way Mishaps" and was presented through the courtesy of the Southern Pacific. When introducing this picture S. L. Chapin, safety supervisor, Southern Pacific, said that the script was based on six serious accidents that had occurred in the maintenance of way department of his road. He added that the picture is used to educate employees in safe methods of doing work and is exhibited to all maintenance of way employees periodically, the period between showings now being about four months.

Still another moving picture on safety in maintenance of way work was presented during one of the Roadmasters' sessions. This picture, entitled "Use Your Head," was presented through the courtesy of the Denver & Rio Grande Western. It was composed largely of realistic scenes showing various types of accidents that occur in maintenance work, many of these scenes being followed by others depicting the safe way of performing the operations.

The conventions were highlighted by a number of special events. One of these was the election of three new honorary members, namely, Mr. Chinn, T. F. Donahoe, retired roadmaster, Baltimore & Ohio, Pittsburgh, Pa., and Frank R. Layng, vice-president and chief engineer, Bessemer & Lake Erie. Another was a banquet on Wednesday evening which was tendered to members of the two associations and their families by the Track Supply Association and the Bridge and Building Supply Men's Association. A total of 984 persons attended this event. Still another special activity was an inspection trip, attended by about 180 members of both groups, to the Carnegie-Illinois steel plant of the United States Steel Corporation at Gary, Ind. This trip was made on Thursday afternoon, the closing day of the convention.

Election of Officers

In the election of officers of the Roadmasters' Association at the final session on Thursday, Mr. Chaney was advanced from first vice-president to president; R. L. Fox, division engineer, Southern, Alexandria, Va., was advanced from second vice-president to first vice-president; Neal D. Howard, editor, *Railway Engineering and Maintenance*, Chicago, was elected second vice-president; and E. E. Crowley, roadmaster, Delaware & Hudson, Albany, N.Y., was re-elected treasurer. The directors elected were Mr. Campbell, and G. L. Morrison, assistant engineer maintenance of way and structures, Southern Pacific, San Francisco, Cal.

Six subjects were chosen for investigation by committees during the ensuing year, as follows: Modern Methods of Controlling Vegetation and Woody Plants; Functions and Responsibilities of Section Gangs; Keeping Power and Spring Switches in Operation During Winter Storms; Educating Track Employees in the Cost of Materials, Tools and Equipment; Use of Work Equipment at Derailments and in Coping with Other Emergencies; and Reducing Rail Joint Maintenance.

The report of the secretary indicated that the association has enjoyed a phenomenal increase in membership during the past year. Specifically, as of September 15, 1947, there were 822 members of all classes in good standing, as compared with 651 a year ago. The figure for this year includes 662 active members, 38 life members, 115 associate members and 7 honorary members.

All six committee reports presented during the meeting are published in full in following pages, together with abstracts of the discussions that followed their presentation. Also included are abstracts of the addresses by Mr. Aydelott, Mr. Budd and Mr. Rishell. The addresses by Mr. Hursh and Prof. Peck will be published in subsequent issues.

Again next year both the Roadmasters' and the Bridge and Building Associations will hold their conventions concurrently at Chicago, the tentative date being September 21-23.

"Only Salvation" Is More Machines

THE problems confronting the railroads, and the part that maintenance officers must play in coping with them, constituted the theme of Mr. Aydelott's paper before the joint opening session. Referring obliquely to the present predicament in which the railroads find themselves because of rising costs, he said, "it is fortunate for our country and for those of us who are connected with the railroad industry that our great system of railroads was built and perfected some years ago", explaining that at present-day costs of both labor and materials "even the most courageous of investors would scarcely undertake the risk that would be involved in financing the construction of a railroad plant. . . ."

Mr. Aydelott emphasized the magnitude of the 15½-cent-an-hour increase recently awarded maintenance of way employees, by saying it represents "the hourly rate of pay of this group when he was in construction service 30 years ago. Moreover," he said, "every article that is purchased for maintenance and construction purposes has had a price increase of 50 to 80 per cent, and some items have increased in price even more." He added that the outcome of the railroads' present case for higher rates will contain the "answer to the question of whether our American railroads will remain solvent or whether, like the railroads of all foreign countries, they will pass into the hands of the government."

Mr. Aydelott regards mechanization in the maintenance of way department as "your only salvation if our plant is to be maintained to the necessary high standard on reasonable budgets." If the present pace toward mechanization is continued, he is of the opinion that the result will be still greater productivity by a smaller force, "although we will have to find ways and means to eliminate those delays which reduce the productive time. . . ."

Turning to a consideration of the safety problem, Mr. Aydelott said that the solution is "an undertaking which will require a strong cooperative effort, not only to make our maintenance employees conscious of their own responsibility but, in addition, to find some way of giving them greater security against accidents, particularly when on movements to and from work and in the operation of machines that make considerable noise."

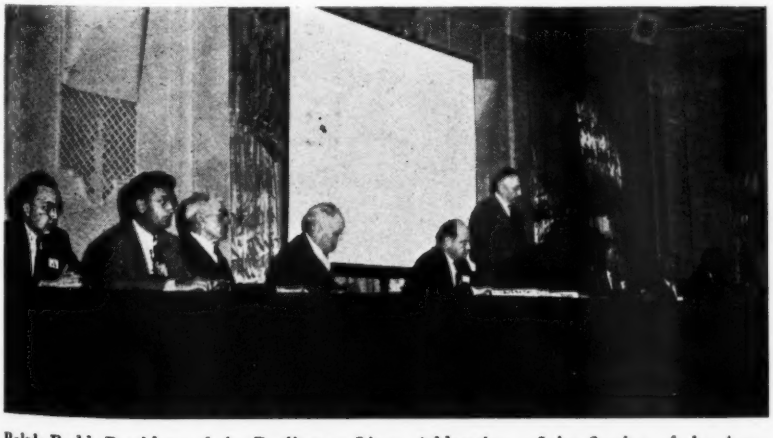
Budd Condemns Railroads' Detractors

IN HIS address before the joint session on Wednesday afternoon, Mr. Budd stated that he would like to speak a little about "what is right with the railroads." One of the things that Mr. Budd feels is right with the railroads is that their "tracks and fixed properties generally are maintained to a much higher standard than ever before." In making this statement he was referring to the capacity for handling large trains safely at high speeds, being "aware that not enough tons of steel rail have been laid in the tracks in recent years to offset the wear and tear of heavy traffic."

Another thing that is right with the railroads, in Mr. Budd's opinion, is the present capitalization of the railroad systems of the country as a whole. While it has been popular to say that the railroads' trouble is that they are over-capitalized, he said that this has probably never been the case. As proof of this statement only one figure need be cited, he asserted, this being the total interest on all funded debt of the railroads in the United States, which now amounts to about $400 million a year. The most recent increase in wages for railway employees, he said, amounts to more than all the yearly interest on the funded debt of all the railroads of the country—and this increase followed a similar increase of even larger proportions only a year ago.

Mr. Budd does not think that the general welfare is well served when anyone exaggerates the effect of the railroads being unable to meet, 100 per cent, the immediate requirements of any extraordinary demand for cars. The same inability to fill orders 100 per cent in every other industry is accepted as a matter of course, he said. "We wait for delivery of a new automobile without thinking the automobile factories have broken down."

Mr. Budd also touched on the improvements that have been made in the railroad plant, making it possible for them to handle 64 per cent more ton-miles of freight during World War II than they handled in 1929, even though the number of cars and locomotives at their disposal was substantially less. He spoke, furthermore, of the urgent need for the Interstate Commerce Commission to act promptly and favorably on the pending application for an emergency increase of 10 per cent in freight rates.



Ralph Budd, President of the Burlington Lines, Addressing a Joint Session of the Associations on the Second Day of the Meetings

ROADMASTERS

Rishell Asks Help In Research on Ties

AT THE outset of his address on "Research to Reduce Mechanical Wear and End Splitting of Railroad Ties," Mr. Rishell explained that his purpose was to present a picture of what the lumber industry would like to do to help the railroads improve the service of wood crossties. He explained further that the National Lumber Manufacturers Association, through its Committee on Products and Research, has proposed a program for research calculated to reduce mechanical wear and end splitting of railroad ties. It is anticipated, he said, that this project can be adequately financed for approximately $40,000 a year for three years, with 50 per cent of the amount to be furnished by the lumber industry and 50 per cent by the railroads.

Regarding the need for the research

program from the standpoint of the railroads, he stated that "on the whole it can be safely said that the railroad tie today is no more wear resistant than it was a century ago." Although modern methods of preservative treatment have made it theoretically possible to obtain an average of 25 to 30 years of service life from ties, this average is rarely if ever realized, he said, because of mechanical wear. The necessity of getting more life from ties, said Mr. Rishell, is becoming increasingly urgent because of ever-increasing costs of buying and inserting ties, which now amount to $4.50 or $5.00 per tie.

Regarding the prospects for getting results from a research program, Mr. Rishell cited information to show that "wood can be changed physically so as to provide it with entirely different properties than it has in the natural state." After discussing the causes of mechanical wear Mr. Rishell said that, to overcome these difficulties it is necessary only to apply present knowledge of wood technology.

However, he foresees difficulty due to the fact that many of the processes which have been developed in the laboratory are still only "laboratory curiosities," pointing out that the problem of dealing with the economic phases of the undertaking will probably "cause the most trouble." The lumber industry, he said, has a great deal of technical knowledge of wood, its properties, characteristics and serviceability, but the co-operation is needed of those men who are most familiar with the requirements of ties in service.

Advance Preparation of Track for Rail Renewals

Report of Committee

THIS report of recommendations for the advance preparation of track for rail renewals is made with the thought in mind that, because of the heavy out-of-pocket expense per mile for such renewals, anything which can be done reasonably to increase the life of the new rail will produce important savings in the long run. Any increase in rail life will also be reflected in longer life of the ties and fastenings.

R. W. Putnam
Chairman

Preparing Roadbed and Track

Bank restoration and drainage—If embankments are not of standard or sufficient width to support properly a full ballast section, they should be restored in advance of new rail installation. This applies also to cuts which require restoration to standard roadbed width, and to the construction or clearing of cut ditches. Embankments at bridge and trestle ends should be restored to proper width and compacted.

Surfacing, ballasting, lining, tie renewals—The scope of track work to be accomplished in advance of new rail application depends largely upon the condition of the track at the particular location. Therefore, each location should be studied in the field and conclusions reached with all concerned as to the exact nature and amount of work to be done in advance to protect the new rail against damage which would otherwise result in its giving unsatisfactory service. It is not practicable to lay down a single rule that will apply to all locations. The following is offered, however, in general, to cover the matter:

Ballast Renewal

At locations where there is to be a heavy ballast renewal, including a high raise, or rehabilitation of the track in general, such as change in grade or line, the ballast renewal, raise and changes should be made, including the renewal and spacing of ties, in advance of rail renewal. Tamping should be done by shovels or forks, as is the practice of the individual railroad, and far enough in advance to allow a compacted ballast section to form, so that when the new rail is laid it can be given a final surface with power tampers. It is recognized that some slight respacing of ties may be necessary under the new rail at the time of final surfacing, due to changes in joint locations, but rail punishment will be minimized. All work should conform to engineer's stakes. Classification of the rail to be released can be made in advance of relay, or it can be made at the stores department headquarters after it has been shipped in from the field.

At the majority of locations on main lines where new rail is to be applied, the present line and surface will already be in good and satisfactory condition, including, in general, fairly good ties. Where this condition prevails, it should not be necessary to make a raise of the track prior to removal of the rail, but a 2-in. to 3-in .running surface raise should be made immediately after the new rail is laid and power-tamped, at which time the necessary tie renewals can be made and the ties spaced. This should not in any way damage the new rail and it will reduce to one the number of times the new ties will have to be spiked.

All curves and tangents should be checked for line, staked by engineers when necessary, and, in all cases, any lining necessary to bring the track to correct centers should be done in advance of laying the new rail, accompanied by the proper smoothing up of the surface where the track has been disturbed in the lining operations.

In mountain territory, where excessive curvature and slow speed cause frequent rail renewals, due to curve wear, and where the ties have already been spaced, the advance surfacing can ordinarily be confined to spotting low places, or individual irregularities, except where ballast renewals are necessary, as indicated previously.

Other Details

Grade crossings—In order to expedite the relaying of rail, street and highway crossings, and all other grade crossings, should be prepared in advance, insofar as possible, to receive the new rail. If this is done, the only work that will be necessary after the new rail is laid will be to make the final surface by power-tamping, and to replace such crossing plank and paving as may be necessary.

If any change in height of rail is to result, it should be determined in advance how the adjacent surfaces of crossings will be taken care of, and arrangements should be made to have material on hand to complete the crossings, and to keep them suitable and safe during the rail-relay operations. In this connection, local, city and highway departments should be contacted to review the job and to close the crossings for the time necessary during laying.

Signals—Arrange to do all preparatory signal work possible to avoid delay in actual relaying of rail. Note the locations of insulated joints that have to be relocated, and any signal changes which might be involved, and accomplish as much necessary work ahead of rail laying as is possible.

Track anchorage—It is important that supervisors make an advance study of the tendency of existing rail to move and be prepared to make any corrections found desirable in the manner of applying anchors when the new rail is laid.

Rail and fastenings—Definite understanding should be had as to how and where material will be unloaded. The territory in which rail is to be laid should be marked in a suitable manner by chalk or paint marks on the rail, or by stakes in a manner that will expedite the unloading and eliminate errors in distribution. Rails should be unloaded with a crane and set on the towpath opposite the points where they are to be placed in track (preferably 5 ft. or 10 ft. back of their ultimate locations in order to eliminate the necessity of having to pull the rail back when laying with a rail crane). If possible, rail fastenings should be unloaded from the same work train handling the rail in order to save the expense of additional work-train days. However, if the lapse of time from receipt of rail until laying is to be more than usual, the unloading of the fastenings should be postponed until shortly before rail laying because of the hazard of having this material lying along the track.

At bridges or trestles, sufficient rail to extend across these structures should be unloaded on the bank adjacent to the ends of the structures from which laying will start. Just before the laying takes place, it can then be distributed across the structures for setting in.

The location of all switches should be definitely marked to assist both the unloading and laying. At each switch location the proper number of rails should be unloaded to take care of the leads. Point rails, guard rails, frogs, switch plates and frog plates should be unloaded as nearly as possible opposite the exact points of installation. It is the best practice to have closure rails, stock rails and guard rails pre-cut, bored and stocked in the factory or shop before shipment to the job. Careful check of the materials must be made after the unloading in order to know definitely that none is missing or to permit correction to be made. Compromise joints should be plainly marked as "left" and right", and unloaded at exact locations for insertion.

At any location where a new switch does not conform to the old, either because of a different length of lead, or because of slight change in location, enough switch ties should be installed in advance of laying rail to support properly the switch points and frog and properly take care of switch operation.

Insofar as possible, high and low-carbon rail should be unloaded in accordance with the practice of the company.

Short rails for insertion on the inside of curves to adjust rail centers should be unloaded at the proper locations.

Last-Minute Details

Preparation of material and track immediate in advance of rail laying—If any type of grease packing is to be applied to joints at the time of laying, the packs should be distributed immediately in advance of laying so that no delay will be experienced in making their application to the angle bars. Where no packing is to be used, the angle bars should be hung on the end of the rails in advance of laying, adjacent to the crane in the direction of laying, using two bolts, but left loose enough to permit setting in on the rails. Grease can be applied either before or after laying, but if done before, care must be taken to eliminate foreign matter, such as dirt or gravel, adhering to the fishing surface.

Immediately before relaying, tie plates should be distributed in the center of the track to expedite putting them in place. Cribs should be cleaned out to a sufficient depth below the tops of ties to avoid interference with adzing machines. Check should be made for throat-cut spikes which might delay spike pullers. Creosote or other wood preservative should be on hand, ready for use on the adzed ties.

The organization of the rail-laying crew is of great importance and considerable advance study should be made to make it the best possible. Advance arrangements should be made with the transportation department as to the actual time the track may be kept out of service. See that rail expansion shims are on hand and that those responsible for laying the rail know the proper shims to use. Check all equipment and tools to see that they are in good working order, as they are frequently moved from one job to another and may not be in the best condition.

Off-track cranes and other off-track machines are being pressed into use more and more, and when this class of machinery is to be used in laying rail, careful planning should be done regarding exactly how the machines will be moved where passageways are not already provided.

Reballasting of Track Should Be Done in Advance of the Rail-Renewal Operation

ROADMASTERS

Committee Personnel

R. W. Putnam (chairman), asst. engr. m.w.&s., S.P., San Francisco, Cal.; N. F. Alberts (vice-chairman), gen. fore., C.M.St.P.&P., Chicago; W. M. S. Dunn (vice-chairman), gen. insp. tracks, N.Y.C.&St.L., Cleveland, Ohio; R. E. Dove, mang. editor, Railway Engineering & Maintenance Cyclopedia, Chicago; H. C. Fox, div. engr., Sou., Greensboro, S.C.; G. W. Hammond, rdm., M.P., Kinder, La.; C. J. Jaeschke, div. engr., M.P., Falls City, Neb.; W. M. Jaekle, div. engr., S.P., San Francisco, Cal.; G. L. Lambert, rdm., S.P., Portland, Ore.; J. L. Marsh, rdm., S.P., Colton, Cal.; J. B. Martin,* gen. insp., Woodings-Verona Tool Works, Chicago; G. B. McClellan, gen. rdm., T.&P., Ft. Worth, Tex.; H. V. Meek, rdm., D.&R.G.W., Salt Lake City, Utah; G. L. Morrison, asst. engr. m.w.&s., S.P., San Francisco, Cal.; P. F. Muller, rdm., C.&W.I., Chicago; B. F. Myers, rdm., G.C.&S.F., Cleburne, Tex.; G. J. Rader, trk. supvr., P.M., Saginaw, Mich.; A. G. Reese, dist. maint. engr., C.B.&Q., Galesburg, Ill.; R. F. Reeves, supvr., C. of Ga., Eufaula, Ala.; W. W. Salisbury, div. engr., M.P., St. Louis, Mo.; E. W. Scott, asst. div. engr., Erie, Buffalo, N.Y.; S. H. Shepley, asst. ch. engr., E.J.&E., Joliet, Ill.; W. H. Sparks, gen. insp. track (retired), C.&O., Russell, Ky.; H. W. Stetson, gen. supv. m. of w., Me. Cent., Portland, Me.; P. Traut, rdm. (retired), C.B.&Q., Red Cloud, Neb.; T. N. Turner, rdm., M.P., Newport, Ark. and H. W. Wolcott, rdm., C.B.&Q., Edgemont, S.D.

Discussion

E. L. Banion (A. T. & S. F.) opened the discussion by stating that he wondered if any roads are now following the practice of keeping the track in good surface up to the time the rail is renewed, pointing out that such a practice has many advantages in that it permits the new rail to be laid without a wholesale working of the track. He also expressed the view that flat-bottom tie plates should be firmly anchor-spiked. Mr. Banion disagreed with the recommendation of the committee that joint bars be attached to rails in advance of laying, particularly where joint packing is used. He pointed out that in desert country and sim-

*Deceased

ilar locations, sand and other harmful matter are likely to get into the joint if this is done. In such instances, he said, the small amount of time saved in rail laying by applying the bars in advance is not justified by the larger cost resulting from damage in the joint area due to abrasive action. N. F. Albert (C. M. St. P. & P.), who, as vice-chairman of the committee, presented the report in the absence of Mr. Putnam, agreed with this latter statement, adding that adzing machines also throw a large amount of dirt into the grease packing when it is applied to the joint bars in advance of laying.

W. H. Sparks (C. & O., retired) stated that, because of heavier power, heavier cars and faster schedules, new rail will bend and kink a great deal more quickly than in the past and stated that, for this reason, the track must be thoroughly worked in advance to avoid such damage. A. B. Chaney (M. P.) agreed that surfacing in advance of rail laying is highly beneficial. He then added that, in instances where train speeds are unusually high, it is not a safe practice to put the smaller track fastenings in the center of the track, as suggested by the committee, because of the danger of accident as trains pass over at high speeds. In such cases, he said, it is best to delay the placing of the small material on the track until immediately prior to rail laying.

The Roadmaster's Responsibility In Controlling Maintenance of Way Costs

Report of Committee

J. E. Gault
Chairman

IN order to perform his duties in a thorough and efficient manner, the roadmaster, or, as designated on some roads, the supervisor of track, must have a complete and detailed knowledge of the territory assigned to his supervision. This knowledge can only be developed and retained by frequent and carefully-planned inspections, covering all facilities and all phases of the current work program. Properly-trained assistants, where warranted and available, provide very material assistance to the roadmaster in this connection.

A prime requisite for the successful roadmaster is an intelligent understanding of the company's current position with respect to operating revenues and expenditures, and some knowledge of the various factors which are responsible for the development of operating ratios. Efficient operation is not possible unless supervision, from the highest level to the lowest level, is in complete accord with and synchronized to the administrative policy of the management.

Since the advent of modern mass production, vast expenditures have been made for new equipment and motive power so that streamlined performance might be realized along with reduced operating expense. We must apply the same degree of modernization to the physical plant, a major portion of which is made up of roadway and structures. In this report, we will endeavor to consider various ways and means whereby the alert and aggressive roadmaster, by careful planning and intelligent execution of his annual work program, may produce, at minimum expense, a track structure fully capable of meeting all the demands of modern railroad transportation.

Must Understand Accounts

Before the current year's work is completed, the roadmaster will usually have prepared a definite program for the work which he wishes to accomplish during the ensuing year. It is at this juncture that a large part of the success or failure of the following year's program is usually determined. The roadmaster has a more intimate knowledge of his territory than any other maintenance officer, and a studied, detailed analysis of the next year's work largely determines his success in the execution of his program.

At this time, and all through the year, a knowledge of the Interstate Commerce Commission's system of accounts will be of material assistance to the roadmaster in his survey and control of costs. Modern systems of unit cost accounting are being established on most roads and the roadmaster must cooperate fully with the accounting department so that the ultimate result will provide him with an accurate criterion for gaging the proficiency of his various subordinates and working forces.

Salesmanship should never be neglected by the roadmaster in presenting his work program to his superior officers, as many a sound and practical budget submittal has been unnecessarily emasculated because of lack of a sincere and persuasive presentation. It is very necessary that close and continual liaison exist between the roadmaster and the higher levels of management at all times so that waste and duplication of effort may be avoided, particularly with respect to contemplated capital expenditures which may affect certain phases of the roadmaster's program. As soon as the roadmaster has been advised as to budget approval and his allocated quantities of men and material for the coming year, a summary of this information should be passed on to the various foremen, along with a tentative schedule of the sequence of operations. Foremen are thereby enabled to render the roadmaster much valuable assistance

"The Roadmaster Has a More Intimate Knowledge of His Territory Than Any Other Maintenance Officer"

in the detailed execution of the program.

The distribution and handling of track material, tools and supplies must receive the close personal supervision of the roadmaster at all times. It is wise to impress upon the minds of the individual trackman the monetary value of various items of track material. We believe that the annual consumption of nut locks or track washers, for example, would be materially reduced if the trackmen would come to regard each of these units as the equivalent of a five-cent piece.

The tendency to overstock both material and supplies is very prevalent among most track foremen. This is true particularly with regard to the smaller items, the use of which is harder to police, and which are usually forthcoming without further explanation upon submission of the properly-executed requisition form. The establishment of fixed inventories, proper field supervision and accurate daily reporting of material used, will effect considerable reduction in these items of expense.

Surplus salvage material and scrap should be collected regularly at central points for redistribution, or should be returned to the storekeeper's stock. In distributing material, the item of car hire merits constant vigilance on the part of the roadmaster and all his subordinates, as tremendous savings may be realized by proper planning and supervision in connection therewith. The use of trucks for transporting both men and material should not be overlooked in this regard. Continual surveilance must be exercised to guard against the use of defective tools and material.

The operation of work trains in connection with the various phases of maintenance of way work is a matter of growing concern among all of us. Due to the increasing complexity of working agreements between management and the various operating brotherhoods, it is difficult to obtain a reasonable performance per work-train day unless very close cooperation and understanding exists between the roadmaster and various transportation officers relative to each individual assignment for this service.

Must Take Interest in His Men

Among the roadmaster's manifold duties, there is none which affords more latent opportunity for controlling maintenance costs than that of personal contact with and direct field supervision of his working forces. Unless the morale of his organization has been properly fostered and built up, it will be impossible to anticipate with any degree of accuracy the daily production per man hour.

It is becoming increasingly difficult to attract young men to accept railroad employment. Hence, it is imperative to encourage and afford proper training to the new employee. Several practical training courses for maintenance of way work are available at moderate cost. Employees should be encouraged to avail themselves of these opportunities to improve their knowledge of their daily tasks. This will not only produce a better quality of work but, in most cases, will also result in a better satisfied employee. This is doubly important with the rapid increase in the use of power track tools to mitigate the drudgery involved in the use of hand tools.

A knowledge of each man's ability frequently assists in the assignment of employees to the jobs best suited to their individual aptitudes. The use of visual education methods, as available, should be employed to the fullest extent. Safety is a matter of proper education, and adequate attention to the established safety program of his road should be closely correlated with the roadmaster's other activities. Time and motion studies have proved very valuable wherever instituted, and the roadmaster is strongly urged to investigate this activity as applicable to his track forces. Such studies have untold possibilities in the development and control of maintenance costs.

Other Considerations

The roadmaster must be constantly on the alert to develop ways and means to modernize and improve the performance of his track forces. The track motor car is being rapidly supplanted as a medium for the transport of men and material by trucks, some of which are designed for operation on both highway and track. Track patrols have largely relieved the section foreman and his gang of the nonproductive time spent each day in track inspection. The consolidation of small gangs into larger groups, made possible in part by the use of trucks, also enables a much greater degree of job stabilization to be realized. The replacement of old types of work equipment with new off-track machines for grading, ditching, mowing, rail laying, tie tamping, ballast cleaning and many miscellaneous operations, along with the improved and new types of power track machinery now available, has increased the mobility and continuous productivity of the forces engaged in all phases of roadway maintenance and construction to an extent hitherto deemed impossible.

We are of the unanimous opinion that the various ideas and data embodied in the foregoing may well be moulded by an ambitious and progressive roadmaster into a weapon which will be of great assistance in combatting the spectre of increasing and unwarranted maintenance of way costs.

Committee Personnel

J. E. Gault (chairman), asst. ch. engr., C.I.&L., Lafayette, Ind.; J. R. Murray (vice-chairman), rdm., D.&R.G.W., Green River, Utah; P. E. Chapin (vice-chairman), supvr. trk., C.&O., Peru, Ind.; Lem Adams, v.p., Oxweld Railroad Service Co., Chicago; G. J. Diver, v.p., Morrison Metalweld Process, Buffalo, N.Y.; L. V. Johnson, maint. engr., M.St.P.&S.S.M., Minneapolis, Minn.; J. H. Keith, rdm., A.&W.P.-W.ofA., Montgomery, Ala.; H. E. Kirby, asst. engr., C.&O., Richmond, Va.; F. R. Layng, ch. engr., B.&L.E.,

ROADMASTERS

A Group of Representatives from the Burlington Lines, Including (Left to Right) L. L. Seley, Mast. Carp., Hannibal, Mo., R. A. Williams, Rdm., Wymore, Neb., C. B. Young, Rdm., Greybull, Wyo., J. A. Green, Rdm., Curtis, Nebr., E. J. Brown, Engr. of Track, Chicago, President of the Roadmasters' Association, H. R. Clarke, Ch. Engr., Chicago, W. C. Oest, Prin. Asst. Engr., Ft. W. & D. C., Ft. Worth, Tex., R. L. Sims, Asst. Supt., Brookfield, Mo., C. V. Zeiss, Rdm., Gillette, Wyo., G. E. Yahn, Dist. Engr. of M. of W., Burlington, Iowa, A. G. Reese, Dist. Eng., M. of W., Galesburg, Ill., M. L. Haverland, Supvr. Const. Equip., Havelock, Neb., A. W. Schroeder, Supvr. Extra Gangs, Chicago, and F. H. McKenney, Dist. Engr. M. of W., Omaha, Nebr.

Greenville, Pa.; E. T. Lea, rdm., Col. & Green., Columbus, Miss.; F. H. Master, ch. engr., (retired) E.J.&E., Joliet, Ill.; G. P. Palmer, regional engr., B.&O.C.T., Chicago; E. J. Ryan, trk. supvr., D.&H., Plattsburg, N.Y.; R. W. Torbert, asst. to v.p., Oxweld Railroad Service Co., Chicago; E. E. R. Tratman (retired), Wheaton, Ill.; R. E. Vermillion, mast. trains & trk., Mo.-Ill., Sparta, Ill.; B. Bristow, div. engr., B.-R.I., Houston, Tex.; A. Chinn, pres., Terminal R.R. Assn. of St. Louis, St. Louis, Mo.; E. A. Eastin, supvr. trk., C.&O., Peru, Ind.; C. E. Neal, gen. trk. supvr., S.P., San Francisco, Cal.; C. T. Nix, rdm., S.A.L., Abbeville, S.C.; J. A. Rust, div. engr., Southern, Greenville, S.C.; R. T. Spaulding, trk. supvr., B.&M., Mechanicsville, N.Y.; I. D. Talmadge, rdm., L.&H.R., Warwick, N.Y.; and J. A. Stonebraker, A.T.&S.F., Newton, Kans.

Discussion

G. L. Sitton (Sou.) started the discussion by asking how other roads are distributing information on operating revenues and expenditures to their men. A. B. Chaney (M. P.) replied that on his road an annual year book is issued, which separates expenses by accounts and by divisions, but that the only current information disseminated was that which the superintendent was able to report on certain primary accounts at his monthly staff meetings. C. G. Deppen (Reading) added that this practice is followed to some extent on his road.

H. W. Kellogg (C. & O.) said that his road was just beginning to realize the economies that were possible from the use of motor trucks. He stated that half of the sections on one subdivision were motorized and that it was hoped to complete the process this year. In response to a question from the floor, he said his railroad was more or less ideally suited to the use of motor trucks since it was often paralleled by highways.

A. T. Stackhouse (S. P.) stated that all his section gangs have trucks which have improved his safety record and lowered his costs. Chairman Gault said his road had motorized one division with rail-highway trucks with considerable success.

Safety in Operation of Motor Cars and Work Equipment

Report of Committee

J. E. Griffith
Chairman

FIRST in importance in the operation of motor cars and work equipment is the necessity of all concerned being thoroughly interested in and impressed with the need for safety. This attitude must have its birth in those officers who have the authority to purchase the correct types of motor cars and work equipment, with all the safety appliances and attachments necessary for the job to be performed. These officers should also have the willingness to retire a machine when it becomes unsafe and to replace it with units which have proven themselves safe.

When the management is thus convinced and purchases safe and correct equipment, then an equal, if not greater, responsibility rests on the supervisory officers and users of the equipment to watch over, care for and properly use the machines. Unless this responsibility is recognized and the necessary steps are taken, nothing will be accomplished toward the desired end—that is, safety to life, limb, manpower and equipment.

Our subject is divided into two parts. We will first take up safety in the operation of motor cars. Since push cars, trailers and other equipment are so generally used with motor cars, it will be necessary to include some of these more commonly-used units.

Must Enforce Rules

Each railroad has adequate rules covering the use of motor cars, and we feel that it is unnecessary to attempt a rule-book discussion. However, your committee believes there are several important factors that have contributed to the causes of accidents which should be given serious consideration. The rules are formed to safeguard our actions, and should be continually impressed upon all concerned. Laxity on the part of supervisory officers in enforcing these rules will lead to regrettable results. Each should ask himself, "Am I relying too strongly on the assumption that my foremen and other subordinates will do what is necessary without being told?" Each must be responsible for setting a good example so that he can demand safe practices from those under him.

It is very important that the use of each motor car be supervised by a man who has successfully passed all the required examinations.

All motor, trailer and push cars should be properly inspected before being put to use. This inspection should be thorough, covering such important items as brakes, wheel gage, wheel thickness, loose bolts, and prescribed flagging equipment. Flagging equipment should be of sufficient quantity—as stipulated in the rule book—clean, kept in a separate container, and located in a regular place where it will be easily accessible at all times. No car found to be unsafe in any respect should be used until proper corrections have been made.

Information in the required form should be secured covering the movement of all trains. If the prescribed information cannot be obtained, the track car should not be operated except under flag protection.

Every safety-minded officer will know that each force is properly organized, and that designated positions and duties are assigned for putting on, taking off and riding track cars. He should further know that prescribed couplers and coupling pins are furnished and are being used when towing push or trailer cars.

Loading Practices

Attention to the proper loading of men and tools cannot be safely relaxed. Men should not be permitted to ride on push cars, with or without tools, unless adequate arrangements for tool compartments safety seats, footboards and railings have been provided. Several railroads, as part of their standard push car equipment, have adopted trays or side and end boards to prevent tools, tie plates, rail joints or other such items from falling off. Any of these items may fall off in front of and derail the push car, which, in turn, is liable to pull the motor car off the rails. Such derailments rarely fail to cause personal injuries.

An example of the importance of taking time to be safe is seen in the following story of an accident which happened on an Eastern railroad only a few months ago. The roadmaster on one division conceived a plan for an easily-made and inexpensive tool tray to be used on push cars. This tray was so thoroughly endorsed by the chief engineer of the railroad that instructions were sent out over the entire system, making it part of the required equipment to be used by all forces handling push cars.

One afternoon, a section force on this same roadmaster's territory prepared to go to headquarters after a day's work, but laxity, as the result of being in a hurry, shortly collected a very costly toll. In his haste, the foreman failed to see that the tools were properly loaded, and al-

though his push car was equipped with a tray and was with him, too many tools were loaded on the motor car and the use of the push car and tray was neglected. As a result, a lining bar worked off the motor car, tangled with the track, and took with it the life of one member of the force. It does not seem credible that such an accident should take place on a territory where such a priceless idea had its birth.

Prevent Rules Violations

Experience has taught us that some most-unexpected accidents do occur. However, all accidents are unexpected, as most of those responsible for accidents have taught themselves to believe that nothing is going to happen to them. Viligance in training, watching for improper practices, and correcting such practices promptly, are necessary. Surprise tests should be made to see that motor-car operators are respecting the specified speed restrictions in our rule books, the violation of which is largely responsible for collisions between motor cars on curves, and with automobiles at grade crossings.

There are many other classes of motor car accidents, all of which have a direct bearing on compliance with motor car rules. It is not necessary to list all of them. It is necessary, however, to have the proper attitude, determination and stamina to apply discipline when necessary for the violation of motor-car rules, because failure to do so will finally lead to an accident. This committee knows that the supervisory officer, who permits a lax condition to exist with respect to rules violations, has a definite responsibility in the final results.

Work Equipment

The safe operation of work equipment is equally as important as the safe operation of motor cars. Each type of machine presents a different problem, as does each location in which the machine is worked. The safe operation of any machine requires the elimination of unnecessary risks.

Operators of cranes and like machines should make a daily inspection of cables, sheaves, clutches, brakes, slings or tongs, and should not handle loads until any defects found have been corrected. Load limits should be known and observed. In making all hitches, it is important to remember the necessity for proper balance, secure fastenings, and of keeping hands and feet out of the danger zone when the lift is started. Workmen must be in the clear so they will not be struck if the load should happen to fall.

Off-track equipment should also have a daily inspection and any defects found should be corrected. It should be kept clear of the tracks unless properly protected. With the use of various types of trucks becoming more common on many railroads, a new angle of safety must be considered—proper provision for the handling of men, tools and equipment in these trucks. This is a *must*. There have already been surprising accidents as a result of this newly acquired type of equipment.

An entire book could easily be written on the safe use of each of the various items embraced in this report. However, time will allow only a general coverage of our subject. We should realize that trucks are subject to the same hazards as other highway vehicles. These hazards should not be multiplied by loading men, tools and equipment into the trucks so that a minor accident could develop into one with major results. Some railroads require bodies on their trucks, with compartments, so that all tools and equipment may be loaded in these compartments. Free space is left between the compartments for the men to ride.

Tie-tamping outfits, bolt-tightening machines, and the like, should never be worked without proper protection and, in addition to flagmen, when necessary, lookout men should be properly stationed. There are numerous cases in maintenance of way work where it is better to spare a man out of the crew as a watchman, to safeguard the work, than to operate unsafely, cause an accident, and then lose more man-hours than those saved, in investigations and in making reports as to why the safe way was not followed.

Work equipment supervisors should require that machines be kept clean and lubricated. The operators should be schooled in making minor repairs. In large gangs where enough work equipment is used to justify the presence of a work-equipment supervisor, such a man should stay on the job to correct defects promptly and to train operators so that these employees will have the proper knowledge of their machines and will be better fitted to use them when working by themselves on smaller jobs.

Summary

Pick the proper men for foremen and operators and educate them in the need for and desirability of safety by—

(1) holding regular safety meetings;
(2) holding frequent short meetings on the job, giving the men an opportunity to express opinions and views on unsafe items or practices;
(3) making frequent surprise inspections and tests of motor cars and work equipment to keep the foremen or operators alert;
(4) being strict in the enforcement of rules and safety requirements;
(5) being sure that all safety devices justifiable by conditions are supplied and properly used; and
(6) being prompt in giving attention to and making correction of all known unsafe practices or conditions.

If each person concerned with this subject will ask himself the following four questions and do his honest best to correct any weaknesses or shortcomings disclosed, there can be no doubt about there being improvement in our safety records:

(1) What are the most common causes of accidents on my territory?
(2) What method do I use to impress my operators of motor cars and work equipment with the importance of safety?
(3) After an accident, do I use any definite method to inform all others, working on similar jobs, of what has happened?
(4) What method do I use to safeguard my men working in large gangs where power-driven equipment is used?

ROADMASTERS

Committee Personnel

J. E. Griffith (chairman), asst. ch. engr., m. w. & s., Sou., Knoxville, Tenn.; P. L. Koehler (vice-chairman), asst. supt., C.& O., Peach Creek, W. Va.; T. F. Scholes (vice-chairman), formerly supvr. trk., P.R.R., Ft Wayne, Ind.; W. E. Amburgey, supvr. trk., C.&O., Mt. Sterling, Ky.; J. S. Anthony, trk. supvr., Sou., Gastonia,

"Attention to the Proper Loading of Men and Tools Cannot Be Safely Relaxed"

N.C.; B. C. Barman, rdm., S.P., El Paso, Tex.; F. A. Carlson, rdm., D.W.&P., Virginia, Minn.; W. E. Chapman, div. engr., C. of Ga., Columbus, Ga.; Coy Delk, rdm., A.T.&S.F., Kingman, Ariz.; W. C. Foster, dist. rdm., T.&P., Bunkie, La.; W. L. Fowler, div. rdm., D.M.&I.R., Two Harbors, Minn.; A. E. Hendrix, trk. supvr., Sou., Durham, N.C.; W. T. Iverson, rdm., C.B.&Q., Centralia, Ill.; W. B. Jensen, m.c. repairman, G.N., Great Falls, Mont.; J. L. Johnson, rdm., M.P., Coffeyville, Kan.; J. R. Kanan, asst. engr. trk., Ft.W. &D.C., Ft. Worth, Tex.; M. W. Kopp, asst. engr., I.C., Chicago; W. E. Manning, trk. supvr., Sou., Salisbury, N.C.; E. Carl Shreve, ch. engr., W. Md., Baltimore, Md.; G. L. Sitton, asst. ch. engr., Sou., Washington, D.C.; S. E. Tracy, supt. wk. equip., C.B.&Q., Chicago; and A. H. Whisler, asst. engr., m. of w., P.R.R., Philadelphia, Pa.

Discussion

J. B. Kelly (M. St. P. & S. Ste. M.) opened the discussion with the remark that he thought the report was a step in the right direction, especially that part relating to the loading of tools on motor cars. He stated that his road had deepened the tool trays on its motor cars to eight inches to prevent accidents. He thought it should also be emphasized that men should not ride on push trucks. In reply to his question as to whether the committee had taken up the matter of what should be done about torpedoes being brushed off the rail by the rail sweeps, Chairman Griffith replied that they had not covered that situation.

H. W. Kellogg (C. & O.) said that the rules on his road require that any torpedoes exploded by motor cars be replaced. In addition he cited an example of the need for a definite understanding between the dispatcher and track-car operator before any information is given by the dispatcher to supplement as previous line-up.

J. E. Chubb (P. R. R.) told of an experience which demonstrated the necessity for motor-car operators to comply with the rules down to the last detail if they are to operate their cars without accident.

S. L. Chapin (S. P.) said that, even though his road is using every known method and device for protecting motor cars, accidents are still occurring. So far, he added, no way has been found to prevent those occasional human failures in which a previously careful operator, knowing all the rules, relaxes vigilance and has his motor car struck by a train. He said consideration is being given the necessity of instituting frequent physical tests of motor-car operators similar to those given air-line pilots to try to prevent the possibility of human errors brought on by physical ailments.

Development and Training of Track Foremen

Report of Committee

ALTHOUGH it represents only part of the problem of keeping up the railway plant, roadway and track maintenance present a huge task in themselves. During 1946, which was not a record year, such work involved the expenditure of more than $1,100,000,000. It consumed tremendous quantities of materials, including over 1,200,000 tons of steel rails and more than 37,000,000 crossties. Its widely-scattered operations required the use of innumerable tools, from simple hand tools to enormous, highly complicated and specialized devices. Constant study and research by the railroads themselves, as well as by allied industries, have kept this mechanical plant abreast of modern technical development.

Maintenance of way takes a large portion of the railway expense dollar. If this portion could be reduced by only a small fraction it would have a beneficial effect on the financial condition of the railroads. A good starting point at which to attack the problem is with the track foreman.

Effective methods of improving the foreman's working conditions are often the means of adding to his efficiency. Thus, building up his self respect and confidence will not only benefit him, but also help him gain the respect and loyalty of his men. This strikes at the root of the most important factor of all: namely, morale. This report is not concerned with the reasons for any loss of morale; but in its recommendations for training, it must emphasize the matter of improving it.

Finding the Right Men

While good foreman material is scarce in most localities, a more thorough and systematic effort should be made to discover what is available. Railroad operation never falters when anyone drops out.

Charles Weiss
Chairman

No one is indispensable, and someone is inevitably found for every vacancy. Shaking a well-plucked fruit tree usually brings forth some good hidden fruit. Therefore, before going outside of the organization when foremen are needed, the entire roster should be combed thoroughly. Foremen and supervisors or roadmasters should study each man and pick all future candidates for promotion. Physical examinations, aptitude tests, and records of education, experience, character, personality and other qualities should be enumerated and studied. This process will weed out the misfits and invariably uncover some good men who have previously been overlooked.

At this point, there is a strong temptation to discuss the similarity between the selection and development of foremen and of higher supervisory forces, but to do so is beyond the scope of this committee's assignment. Suffice it to say, that the history of the American railroads contains many dramatic stories of the rise of some of its greatest leaders from the lowest level in the ranks. It would be well for the morale of the rank and file of employees if they felt that such an equality of opportunity existed.

Returning to the matter of selecting foremen, the first step, as already indicated, should be to make a thorough search among employees for potential foremen. This should be given adequate publicity. Likewise, if and when a system of foremen training is set up, it should also be publicized.

Having exhausted the roster, the next step is to canvass the outside community for potential foreman material. Some maintenance man, with the proper personality and ability to speak to groups, should interview high-school authorities and the pupils themselves. In many cases, this will lead to interviews with interested parents. Through such contacts it should be possible to attract many young men of the right make-up, especially if the railroad can offer them summer work or part-time employment until their schooling is completed. Such contacts, especially with the parents, help to build good will toward the railroads.

Many Qualifications Needed

Having outlined the need for training foremen and the methods of attracting suitable material for developing future foremen, it might be well to discuss briefly what the desired object of these procedures should be. The prime need is to develop in the foreman the proper mental and psychological make-up. Perhaps the most important quality is the ability to handle men. The foreman

should be the captain and coach of his team, and, as such, must be able to install a feeling of teamwork, loyalty and cooperation among his men. He should have a good understanding of the problems of management. This will improve not only his morale, but also that of the entire organization. If this much alone is acomplished, the effeort and expense spent in training foremen will be well worth while.

Many older foremen have a sense of pride and personal ownership in their sections. It is "their railroad." The foreman should believe that his job is important. Accordingly, every effort should be made to build up his confidence and self respect, and also his ability to command respect. He should be trained in self-reliance so that he will work out as many details as possible with the help of his team. He will then feel that he is a part of management and a partner in the enterprise. Organizing and planning ability, as well as diplomacy, self-control, and ability to deal with the public, can be developed. Furthermore, the trained man is more sympathetic to new methods and progress. At present, too many foremen are "agin" anything that is new.

In addition the aforementioned qualities (which we used to think a foreman had to be born with, but which we now know can be acquired) a foreman must, of course, know his job. He should know the best methods of doing all kinds of track work. He must be familiar with the required tools and machinery. He must be thoroughly grounded in safety, in making reports, in keeping records, and in the handling of emergencies. His training should enable him to answer the following five questions: How? When? Where? What? and Why? In a word, foremen are wanted who can get out maximum production efficiently, safely and harmoniously. Time does not permit the enumeration of many other qualities desired in foremen, such as good housekeeping and neatness.

An Important Qualification of a Foreman Is a Sense of Pride in His Section

The important question raised in the subject of this report is how to develop such a product? On the railroads, practically all such efforts in the past have been spasmodic and superficial. Employees have been qualified in rules of operation. Porters, cooks and mechanics have received instruction in technical skills. Some track supervisors conduct classes on their own initiative, often with beneficial results. However, in the light of the oportunities still available to cut costs, as well as to improve the morale of the entire department, and also to improve labor-management relations by thorough training, all of these efforts in the past may be considered trivial. There have always been men who have advanced their own education and training, often by taking correspondence courses, and this should be encouraged.

As suggestive of what might be done on the railways in the training of foremen, the experience of other industries is interesting. Many of them have, for years, recognized the importance of training supervisory personnel. One large oil company has conducted a school for employees in all of its departments for over 25 years. This company has a fine brick school building containing full-size installations of filling stations and oil-using machinery, as well as miniature installations of complete refineries. Charts, graphs, training aids, slides and motion pictures are used to supplement instruction. The teachers and conference leaders, with the cooperation of the State Department of Education, are trained in a concentrated course. About 15 foremen are trained at a time in a two-weeks' course in the fundamentals of supervision. Space does not permit the presentation of further details; but this program has been a major factor in the company's recognized good employee relations. It has also resulted in an extremely low rate of labor turn-over, and provides a pool of trained men for responsible jobs.

Many industries have used the facilities of universities in their training programs. An outstanding example is the work that has been done at one state university for hundreds of industries within the state over a period of some 25 years. Under the plan set up, foremen are trained in groups, taking a course of training that has been tailor-made to fit the needs of the particular industry. These tailor-made courses are the result of surveys to develop the needs of both the management and the supervisors themselves. Certificates are presented at the completion of the training period. A few railroad shop men have been included in this training.

At some universities in large cities special courses are given for top-flight executives. Many men have also received valuable training from correspondence courses. These cover the work of foremen and roadmasters. A few railroads have developed correspondence courses of their own. The Bureau of Industrial and Technical Education of one state education department has developed a unit course in locomotive firing. This text, prepared at the Curriculum Construction Laboratory, in cooperation with the officers of a railroad, is very suggestive of what could and should be done for track work. Much could be learned also from the intense methods of instruction developed by the military services under the stress of war. In fact, education in general has profited from this experience.

ROADMASTERS

Another Arrangement

Another promising set-up has been the recent arrangement set up by one of the larger railroads with several state universities along its line. At one of these institutions the Department of Extension, in collaboration with the Psychology department and officers of the railroad in question, has developed a course of "Training in Human Relations and Supervisory Personnel," involving a 16 weeks' course of two hours weekly instruction and conference. Over 700 men of different ranks in the various departments have taken this course thus far. Classes have included supervisors and division engineers. It is stated that, eventually, everyone from the president down to the section foremen will receive this training. It remains a question whether or not classes should be confined to the same level of supervision. In the military services classes often included commissioned and non-commissioned officers; and the instruction included matters of strategy that very few of the class would ever use. Nevertheless, it was felt worth while to broaden the horizon and perspective of all. The mixed classes at the university in question do increase a man's interest in the entire organization.

Basing the training on the aforesaid, it would be desirable to divide it into two phases. The first would be a course similar to those given at one of the universities previously referred to. Such a course would be beneficial for both new and existing foremen. With the inspira-

tional background of this first phase, the second, or technical, part of the training could probably be best conducted by the individual railroads themselves. As a matter of fact, the first course might also be developed by the railroads and coordinated with the second, or technical, phase. It would thus be possible to teach in a matter of weeks what is ordinarily absorbed in a much longer period. Actually, as now taught, many foremen probably never learn many of the important things such a course could include.

Railroad-Conducted Courses

"Railroad" schools could be conducted with a minimum of interference of the regular work if held during the off-season. Furthermore, a faculty composed of outstanding roadmasters, supervisors, foremen and others could then be most easily spared from their regular assignments. The life blood of any school is its faculty; therefore, the best men should be selected as instructors and teachers. They need not be in the prime of their physical vigor. They should certainly not be selected merely because they can be spared most easily. Furthermore, even the best men should be given a brief course in teaching, similar to that which some large corporations provide. Specialists may be used for teaching such subjects as safety, first aid, gas engines and machinery, accounting, wrecking and emergencies, operation, finances, etc. For texts, the standard manuals, plans and rules would have to be adhered to and covered. These are usually more in the nature of bare specifications. For purposes of instruction, better texts could be developed in time.

The railroads have centrally-located buildings where such instruction could be given. Facilities for slides and motion pictures and practical demonstrations should be provided. The students could then demonstrate their ability to carry out instructions. Visual instruction in the way of slow-motion pictures would be valuable in demonstrating operations like tamping, spiking and the use of tools.

Such schools, although designed to train new foremen, would be of great benefit to the entire existing force if representative foremen from different divisions were sent to them. These men could then pass on what they have learned to the others. It must, of course, be understood that no amount of instruction ever relieves the supervisor of his function as a teacher; but such training would make his task more productive.

Special Considerations

The matter of compensation offers little complication. A man who is given such an opportunity for training should be willing to take it without additional compensation other than any additional expense involved. The latter could be reduced if a camp were available for housing and feeding the students, in conjunction with the instruction facilities. Such an arrangement would add a desirable atmosphere. If the railroad management deems it advisable, it might offer some increase in compensation as a further inducement to better effort.

The question arises as to how such training and the future assignment of specially qualified and trained men could be worked in with union regulations. This subject is beyond the province of this report, but the committee has given the matter some study and feels that any difficulties could be worked out. Training certainly should add to a railroad man's fitness and ability. His job should take on a deeper meaning for him. He is a part of a community or family that accomplished the impossible during the war, and, as such, won the admiration of the public. Now, with peace, this is all being forgotten. Nevertheless, the attitude of the man has much to do with the welfare of the railroad, with the national economy, and, perhaps with the survival of our economy.

Tours of Railway Plant

At the conclusion of the various courses, the graduates should be presented with an award or certificate. This occasion could be dramatized much more by actually taking the graduates on a tour of the plant. It is surprising to find how many foremen of long service have never seen more of their railroad than the division on which they work. The various operations could be explained by a guide in a way that would arouse the graduates' interest and pride. They would recognize the complexity of the organization, and also realize how important a part railroad transportation plays in the national economy. Such a trip might include a large passenger terminal, a busy classification terminal, various kinds of shops, a large storehouse, some traffic and accounting offices, the trace bureau, and perhaps the general offices. There, a higher executive might present them with their certificates of graduation. The memory of such a trip would never fade away. It would make each man feel that he is devoting his life to an enterprise of incomparable importance and interest. Such a trip should increase any man's loyalty and respect for management.

This report, of necessity, has had to be of a general nature. Nevertheless, its conclusion is obvious. The development and training of foremen is an urgent need in maintenance work. It should be given consideration as soon as possible, and undertaken sympathetically and vigorously.

Committee Personnel

Chas. Weiss (chairman), supvr. trk., P.R.R., Valparaiso, Ind.; F. L. Vault, Jr. (vice-chairman), supvr. trk., N.Y.C., Kingston, N.Y.; E. F. Snyder (vice-chairman), supvr. trk., I.C., Corinth, Miss.; L. C. Blanchard, rdm, C.M.St.P.&P., Mitchell, S.D.; S. J. Caesar, trk. supvr., C.W.P.&S., Chicago; R. V. Dangremond, supvr. trk., E.J.&E., South Chicago, Ill.; L. E. Flinn, rdm., C.B.&Q., Chicago; R. Gilkey, div. engr., C. of Ga., Savannah, Ga.; C. O. Hoglund, rdm., S.P., Carrizozo, N.M.; H. C. Koch, rdm., C.&W.I., Chicago; M. D. Packam, rdm., A.T.&S.F., Emporia, Kan.; S. Payson, rdm., St.L.-S.F., Enid, Okla.; C. C. Pelley, trk. supvr., I.C., Chicago; T. J. Reilly, rdm., S.P., Berkeley, Cal.; E. F. Saum, asst. engr., N.Y.C., Erie, Pa.; C. R. Schoenfield, rdm., C.B.& Q., Aurora, Ill.; J. T. Shepherd, Jr., rdm., N.&W., Buena Vista, Va.; T. H. Stitt, rdm., S.P., Ogden, Utah; W. C. Vandiver,

Part of the Large Group of Pennsylvania Men at the Conventions. Shown here are (Left to Right) E. R. Schultz Ch. Engr. M. of W. Eastern Region, Philadelphia, Pa., L. E. Gingerich, Ch. Engr. M. of W., Central Region, Pittsburgh, Pa., S. R. Hursh, Asst. Ch. Engr.-Maint., System, Philadelphia, Pa., C. G. Grove, Ch. Engr. M. of W., Western Region, Chicago, C. Weiss, Supvr. Track, Valparaiso, Ind., E. E. Martin, Asst. Engr., Altoona, Pa., A. H. Whisler, Asst. Engr., Philadelphia Pa., E. W. Caruthers, Asst. Engr., Philadelphia, Pa., H. C. Kohout, Supvr. Track, Colehour, Ill.

trk. supvr., L.&N., LaGrange, Ky.; C. VanVelkinburgh, rdm., C.B.&Q., Creston, Ia.; R. D. VanVranken, ch. engr., Jacksonville Terminal Co., Jacksonville, Fla.; and J. G. West, div. engr., A.T.&S.F., Slaton, Tex.

Discussion

In reply to a question from G. L. Sitton (Sou.), Chairman Weiss stated that one railroad had started a program of training foremen but had given it up as ineffective. Its failure was attributed to superficial planning. He knew of no other programs presently in force on any railroad which had been in operation long enough to warrant inclusion in the report as tested schemes.

H. W. Kellogg (C. & O.) told of a system of training men that has been in operation on his road for several years, in which the men are brought in once a year to spend a day observing slides, movies and photos relating to safety rules and methods of doing work safely. Each year the program is changed except for fundamental information which bears continual repetition.

Chairman Weiss took issue with W. H. Sparks (C. & O.) for his statement that the right man for a foreman's job should be the one who had gained practical experience by working on the track for many years, by stating that he believed a young man could be trained to qualify as a foreman long before he could gain such qualification by practical experience. By such training, he said, the railroad would then gain many years of good supervision which would otherwise have been lost.

J. B. Kelly (M. St. P. & S. Ste. M.) said he was glad the report included safety as a subject for instruction, for his work often showed him that the safe method not only prevented injuries but usually contributed to higher production.

S. L. Chapin (S. P.) told of the successful visual-education program his road has been using for about five years, during which the accident rate has been reduced by 75 per cent. He stated that the system used followed the pattern of that described by Mr. Kellogg, except that the foremen congregate every 60 days for meetings.

E. L. Banion (A. T. & S. F.) closed the discussion by saying that programs such as outlined in the report were desirable, if money could be spent to make them effective. He stated further that the problem also involved keeping men on the section so there would be someone to train. He said he thought this whole matter of making railroad jobs available, making them desirable and making promotion sought after was a problem not only for supervision but for management as well.

ROADMASTERS

Methods of Increasing the Production of Extra Gangs

Report of Committee

THE subject of this report is one of great importance on all railroads at this time. All have been affected by the war, which has increased the amount of track work needed to be done. The war also affected the labor market, and will continue to affect it throughout the postwar years, or reconversion years.

At all times extra-gang production is a matter of paramount importance, but present higher wages, higher material costs, and labor shortage complicate the job of doing the necessary work with the money and labor available in the limited time allowed. Therefore, unlimited consideration must be given every phase of carrying out track work, such as programming, size of gangs, materials, supervision, and housing, down to the smallest detail.

The programming of work to be done is handled on most railroads in a similar manner, through the general office, so that extra gangs can be set up on a well-planned schedule and every attempt made to follow through. By adhering to these programs and completing them in the alloted time there should be no delay in having the necessary materials available at the right time and the right place. Frequent visits by division and general officers is of great importance to insure efficient and satisfactory operation and adherence to the program.

Preliminary Work

To get the best production from any extra-gang organization it is first necessary that all material be on hand when needed. It is also necessary to have everything distributed so that the gang can carry out the work with the least possible delay. That this may be accomplished, it is good practice to have a small gang distribute the material ahead. In connection with a steel gang operation, this same gang can also pick up the old material behind the steel gang. Ample time must be allowed for the distribution of materials so that each piece of material is placed where it can be readily moved into position. Kegs of bolts and spikes should be placed where they can be loaded for distribution without delay, a sufficient amount of rail should be distributed to complete the job, without the necessity of moving it any farther than necessary. Short rails should be furnished for curves.

R. G. Simmons
Chairman

It is very important to do in advance all work that might in any way delay progress of the main gang, such as installing difficult turnouts or railroad crossings, opening up difficult street or highway crossing, and installing temporary crossovers for diverting traffic. Turnouts that are to be installed by the steel gang should have all the advance work possible done ahead of the big gang, such as drilling for the guard rails, stocking and drilling of the stock rails, cutting and drilling all rails to proper length, sorting and laying out of all switch and turnout plates, and, where turnouts are to be installed in new locations, the turnout ties should be installed. Any large extra gang ballasting or laying rail can lose much valuable time if the preliminary work is left for them to do.

Size of Gangs

The size of an extra gang needed to do a particular piece of work varies considerable with the kind and location of the work. For laying rail, most railroads favor a steel gang varying in size from 75 to 150 men for the actual installation. The size depends somewhat on the policy of a railroad and the amount of machinery that is available.

Ballast gangs vary in size from 40 to 250 men. It is good practice to line up a ballast-gang organization so that it can handle all the operations required at the same time, namely, skeletonizing, renewing and spacing ties, raising on the new ballast, and lining and dressing. By following this practice, the time lost going over the same piece of track several times with the same gang of men, each time doing different work, is eliminated, and the time that a section of track is affected by work orders and traffic restrictions is shortened considerably. This practice also permits the different men to do the same job each day and helps to reduce labor turnover.

Miscellaneous or small gangs vary in size with the kind of work being done and

the location of the work. Gangs installing turnouts in busy switching ladders can increase their production by prefabricating the turnouts and setting them in place with heavy cranes. Welding and bolt-tightening gangs should work on programs set up for out-of-face work and should maintain close co-operation with the chief dispatcher so they will not run into undue delay in carrying out their work. All of these gangs can increase their production if equipped with the mechanical tools essential to their work.

We are fortunate today to have on the market machinery with which to do almost every type of work, and we should take full advantage of this machinery to increase the production of every type of extra gang. Following are lists of the larger units of equipment that can be used by rail and ballast gangs to good advantage:

Ballast Gang	Rail Gang
Bulldozer	Rail laying crane
Cranes	Spike pulling machines
Trucks	Spike driving machines
Cribbing machines	Adzing machines
Power tamping machines	Power wrenches
Power jacks	Power rail drill
Spike driving machines	Creosote spray
Spike pulling machines	Power rail saw
Power rail drill	Cribbing machines
Power rail saw	
Tie saws (tie gangs)	
Power dressing machines	
Ballast cleaners	

In addition to the above there are numerous smaller mechanical devices that can be used to advantage. It is also very valuable to have available at all times a small pick-up truck so that emergency trips can be made in connection with unforeseen breakdowns and repairs.

Proper supervision is probably the most essential element to an efficient extra-gang organization and to maximum production. To become highly efficient, supervisors must be selected and trained over a long period of time. It is the practice of most railroads to advance gang supervisors up through the ranks from laborer to general foreman. This system has its advantages over most others because of the experience gained by the men over the years as they work up to the top. It is imperative that the general foreman in charge of an extra gang be able to handle all work assigned the gang without undue delay to the gang operations or to traffic. He is the man in any extra-gang organization who can keep production up to the top or let it slide down to a "cellar" position. If he has an unquestionable character, with good clean habits, is intelligent, forceful, energetic, and has the right amount of experience, he will more than likely be a leader and, as such, will be the main cog in the machine that will increase and keep production at the maximum. If he is sure of himself, his contacts with other departments will result in better co-operation, which in turn will lead to increased production. He must have the support of everyone else if he is to accomplish maximum results. It may be taken for granted that he will have the support of all general and division officers, but he must solicit and develop the support of his subordinate supervisors. The way in which these assistants are trained to handle their work is very important. Like the chain which, according to the old proverb, is "no stronger than its weakest link," an extra gang will not function properly if all the links are not exerting an equal amount of effort.

It is usually good policy to place the various sub-foremen in a gang over those phases of the work for which they are best qualified as the result of experience. As these men develop they can be shifted to the supervision of other units of the work until they have mastered them all. There does not seem to be any set rule or any real necessity for putting a limit on the number of laborers one man can supervise. The important thing is to have sufficient supervisors so that every laborer in every unit will be working properly and effectively at all times. The correct number of supervisors results in increased production of any extra gang. Maximum effectiveness is accomplished by having these men so spaced that they will not be overlapping in their jurisdiction. On the other hand, they should not be spaced so thinly that portions of some units in the gang will be without supervision.

Equipment Maintainers

Related very closely to extra-gang supervisors and the efficient operation of gangs are those who maintain the machinery used by the gangs. The more mechanized the gang, the more important these men become, because any gang organized around machinery is lined up on the basis that all the machines will be working. If breakdowns occur, reducing the number of working units, the entire gang is thrown out of balance. Therefore, properly-trained equipment maintainers, with an adequate supply of repair parts, should be on hand to keep the machinery operating during the entire working period.

In most extra gangs, laborers are picked from the ranks to operate most machines. These men should be so trained that they will become the most efficient operators possible. It is rather difficult to keep the same men in the same key positions in an extra gang, but the attainment of this goal is always a boon to production. It is not possible on all railroads to work extra gangs 12 months in the year, but wherever this is possible, the efficiency of the gang is raised and the quality of their work is improved.

The safe operation of a gang is one of the most valuable assets to any organization because good, intelligent men like to work where the operation is handled in a safe manner. The matter of safety must be handled by the general foreman, supported by all the sub-foremen, and must be practiced 24 hours a day, including the "off-duty" hours. This will include all camp conditions, moving to and from the work, and while on the job. If the men realize that they are working in a well-organized, safe organization, they will be more contented and efficient. Also, absenteeism will be cut down by the prevention of injuries, and the same men will be kept on the same job all the time.

Traffic

The gang must start the day off right by having reliable information on all trains that will affect them during their working hours. In many locations it is possible for the extra gang to contact the train dispatcher at frequent intervals by portable telephone, and thereby be kept informed as to train movements. Other locations are ideal for the use of telegraph operators, where telephone facilities are not available.

The handling of trains through or around extra gangs, to cause the least interference

Among the First to Register at the Convention Were G. E. Martin, Superintendent of Water Service, Illinois Central, E. J. Brown, Engineer of Track, Burlington, and R. E. Dove, Managing Editor, Railway Engineering and Maintenance Cyclopedia, All of Chicago

to their work, is very important. On multiple-track lines where it is possible to divert traffic around extra gangs, such gangs are not subject to much interference if they are given the track at a designated time and are permitted to keep it until their day's work is completed. On single-track lines the problem becomes far more complex, and as many trains as possible should be moved through the territory outside the gang's working hours. Trains that must be moved through the working limits during the working hours should be grouped so that as many as possible will pass through with each closing up of the track. Furthermore, the more trains that are moved through the working limits during the noon period the better.

Where possible to do so, when gangs are working on the main track between siding

One of the Many Power Tools Which May Be Used To Increase Extra-Gang Production

switches, the sidings should be used by all traffic. It takes close co-operation at all times between the transportation department and the extra gang to eliminate undue interference to either trains or the work. When working on track where it is necessary to close up for trains, every minute must be accounted for if maximum production is to be realized. The working conditions can be greatly improved and the delay to all departments kept to a minimum if a trainmaster is assigned to be on the ground in direct charge of handling train movements by the point of work.

Ordinarily, a well-organized extra gang is able to complete the entire operation, cleaning up the job to the last detail. However, to realize full production from the gang, it is sometimes good policy to assign some of the lesser tasks to section men. These tasks might include the piling and burning of old ties behind a ballast gang; installing foot guard blocking and crossing planks; and hand dressing around road crossings, station grounds, signals and elsewhere where machine dressing cannot be done. These jobs usually are the most difficult for an extra gang to complete when finishing a stretch of work.

The housing and boarding of extra gangs present a problem that takes unlimited forethought and planning. But it has become increasingly recognized that if this problem is handled properly, production of the gang will be increased. A gang that is properly housed and fed will be more contented, with the result that more men will stay steady with the gang, and that production will be increased.

Most extra gangs are housed in camp-car outfits that provide sleeping, dining, kitchen and commissary quarters, and living quarters for the foremen. These outfits differ on various railroads but usually consist of converted box cars or passenger train equipment. In some instances gangs are kept in stationary quarters. Whatever type of housing is used, the better the camp equipment the better will be the class of labor. All camps should be equipped with sleeping, dining and recreational space, and suitable toilet and laundry facilities. And the cleaner and lighter these facilities are kept, the better inducement they will be in attracting and holding good men.

Good Food Important

The feeding of gang labor is very important if the right kind of labor is to be attracted and kept in extra gangs. The food should be clean, wholesome, properly balanced and properly prepared. This is true both when the gang is fed in camp and when lunches are furnished.

Various methods are used to transport labor from camp to work, but the most common is the use of motor cars and trailers. The advantage of this method over others is that the motor car outfit is able to take the men directly to the job and back to their camp with the least possible delay, especially where large gangs are involved doing main-line work. However, where highways are available or where the gang is small enough that time can be saved, it may be advisable to transport the men in trucks or buses.

When portable camps are used, it is necessary to select proper camp locations and to move the camp often enough so that the daily running time to and from the point of work will be held to the minimum.

Conclusions

In conclusion, we feel that increased production of extra gangs can best be accomplished by (1) setting up the proper organizations to do the jobs that are to be done; (2) furnishing these organizations with good clean food and living quarters; (3) supplying good supervision; (4) having the necessary materials on hand at the right time; (5) furnishing an adequate amount of work equipment; and (6) eliminating all details that might retard progress of the work of the gangs.

Committee Personnel

R. G. Simmons, (chairman), gen. trk. insp., C.M.St.P.&P., Chicago; A. B. Hutson, (vice-chairman), rdm., C.B.&Q., Galesburg, Ill.; T. J. Leonard, (vice-chairman), trk. supvr., Erie, Buffalo, N.Y.; W. O. Allen, rdm., S.A.L., Hamlet, N. C.; H. C. Arnold, rdm., C.B.&.Q., Denver, Colo.; J. N. Balmer, rdm., U.P., Ashton, Idaho; F. G. Campbell, ch. engr., E.J.&E., Joliet, Ill.; M. D. Carothers, asst. ch. engr., G.M.&O., Bloomington, Ill.; A. B. Chaney, dist. engr., M.P., Little Rock, Ark.; M. H. Dick, mg. editor, *Railway Engineering & Maintenance*, Chicago; R. L. Etherton, rdm., C.R.I.&P., Trenton, Mo.; S. J. Gaetz, dist. rdm., G.N., Rugby, N. D.; Gen. Carl R. Gray, Jr., v.p., C.&N.W., St. Paul, Minn.; J. Greenfield, trk. supvr., A.T.&S.F., Sweetwater, Tex.; H. Irelan, rdm., C.B.&Q., Oxford, Neb.; L. E. Laird, rdm., M.P., Falls City, Neb.; R. W. Lucas, rdm., C.R.I.&P., LaSalle, Ill.; H. P. Mason, trk. supvr., B.&M., Boston, Mass.; O. C. Prewitt, dist. rdm., T.&P., Marshall, Tex.; C. W. Reeve, engr. trk., D.&H., Albany, N.Y.; R. H. Smith, pres., N.&W., Roanoke, Va.; B. O. Webb, supvr. of trk., N.C.&St.L., Bruceton, Tenn.; and J. A. Wright, dist. rdm., T.&P., Toyah, Tex.

ROADMASTERS

Discussion

E. L. Banion (A. T. & S. F.) pointed out that there is a definite relationship between the production of extra gangs and the performance of scheduled trains, adding that the report stressed the importance of grouping trains to pass extra gangs without considering the necessity for on-time performance.

J. E. Griffith (Sou.) raised a question regarding the use of spike-pulling machines in single-track territory, pointing out that, after closing the track to allow a train to pass, much time was lost in re-opening the track because of the inability of these machines to move out quickly. In reply, Chairman Simmons stated that, in some instances, the spike pullers are permitted to continue at work, "thinning out," or pulling spikes from every third or fourth tie, for some distance beyond the point of closure, to prevent delays of this nature, the machines being set off by hand. Mr. Griffith agreed with this suggestion, but stated that the practice on his road is to thin out spikes by hand labor. R. H. Smith, Jr. (P. R. R.) stated that, in his experience, three spike pullers were able to move out ahead of a rail gang after a closure without difficulty. H. W. Kellogg (C. & O.) agreed with Mr. Simmons, adding that his road uses two machines to thin the spikes.

C. Halverson (G. N.) asked for additional information relative to cribbing in advance of reballasting work where the cribbing is done by hand. To this, Mr. Banion replied that it is becoming increasingly difficult to obtain men to work in a hand-cribbing gang. On the other hand, he pointed out that machine cribbing requires much planning and must be carefully co-ordinated with the reballasting work to avoid leaving the track overnight in a completely skeletonized condition. In some cases, he said, it may be necessary to crib one-half of the track at a time.

Installation and Maintenance of High-Speed Turnouts

Report of Committee

THE primary purpose of every railroad is to provide fast, safe, comfortable, dependable, and on-time transportation service. The trend of the times is toward greater train speeds, both freight and passenger, and many of our heavy-traffic lines are today operating freight trains at speeds which only recently were considered fast passenger schedules. Furthermore, in all probability, we have not yet reached the top speeds at which we will be required to operate in the near future.

In providing this kind of service, which is highly important in the successful operation of any railroad, the turnout is an important factor. Therefore, turnouts must be installed with the least interruption to traffic—they must be of proper design and construction to permit the highest possible safe speed after installation; and when installed they must be maintained to a high standard.

R. E. Meyer
Chairman

Installation

In the installation of turnouts, it makes little difference whether the turnout is new, a renewal, or of increased weight of material. The location of the turnout should first be thoroughly investigated by the engineering, maintenance of way and transportation departments. Due consideration should be given to the stability of the roadbed and good drainage, and, if possible, the installation should be made on tangent track away from street or highway crossings.

Turnouts, as designed, are precise machines, computed in all their component parts to a fine degree of accuracy. Therefore, it is necessary that they be installed with the same degree of accuracy as designed, and under a competent foreman who has had sufficient experience in turnout work and who has an understanding of the reason why a high degree of care in making the installation is necessary. If such a qualified foreman is not available to supervise turnout work, then such work must be supervised by the supervisor or roadmaster.

As in all work, a finished turnout is no better or stronger than its weakest part, from foundation to final adjustment. The foundation on which the turnout is placed consists of the subgrade, ballast and switch timbers. Before starting any new installation or renewal, it is essential that the sub-grade be provided with adequate drainage. This will present a different problem at each location, but is frequently provided in the form of longitudinal or lateral drains.

A Well-Maintained Turnout in High-Speed Territory

After taking care of drainage, the ballast must be cleaned and thoroughly tamped. The cribs should be cleaned to a depth of one inch above the bottoms of the ties at the center line and to the bottoms of the ties at the ends, following which the track should be raised. Such cleaning will, in most instances, provide proper drainage through the ballast and still retain the foundation built up over the years by traffic.

When installing a turnout at a new location, all of the switch ties and timbers should be installed after the cleaning of the ballast and the raise should be made following the installation of ties. Tamping of the renewed ties should be continued daily, with daily adjustments in alinement, as necessary, until a stable state has again been reached. Only when this condition has been reached should the installation of the steel be made.

Use Sound Timber

If the new turnout is a renewal, careful inspection should be made of all existing timbers for cracks, splits, mechanical wear of plates upon the ties and timbers, or decay or spike killing of ties. All doubtful timbers should be removed, whether they are serviceable or not, as it is far better to remove a doubtful tie to a track of lesser importance than to take a chance with it under new material. It would be preferable if all timbers could be removed, but usually, for reasons of economy the best existing timbers must be continued in use. However, if the installation is being made where tie installations cannot be made readily as required from year to year, then all ties should be renewed out-of-face.

At some locations in terminals and other congested areas, it is advisable to construct the entire turnout outside of track. Where this is done, the old turnout is lifted out of position by means of cranes operating in a work train, and the new one is set in place by the same method.

Before any work is started on the actual installation of a turnout, a careful check is required to see that all parts called for in the standard plan, and of the proper type and size, are on hand. The design of all turnouts is based on a definite spacing of the switch timbers, and this spacing must be strictly in accordance with the plan so as to provide for the proper fitting of all component parts.

Steel Installation

The first step in the installation of the steel is to provide the proper knuckle for the bent stock rail, with the exact amount of bend at the correct location called for in the plans. This is essential, because upon this bend depends the amount of support the straight point will have over its entire length, together with the distribution of the load upon the braces. The

switch points depend upon the stock rail for their lateral support and upon the plates for their foundation.

Having made the bend and drilled the stock rail for the heel block, accurate measurements are necessary in order to locate properly the actual point of switch to receive the benefit of the knuckle and support from the stock rail. In the next step, the stockrail, switch point, straight lead, frog and two additional full length rails are coupled into one complete unit. It is desirable that a full length rail be used at the heel of frog and one ahead of the stock rail to avoid compromise joints or worn rail at these points. This adds materially to the life of frog and stock rail in eliminating joint batter at these locations.

The slide plates are then placed beside the switch timbers in their proper sequence, and must be rechecked to be sure there has been no transposing of plates to give an uneven surface for the switch to rest upon. The guard rail on the straight, or main-track, side having been bolted to the new main-track rail at its proper location, the existing rails are removed from track and the new unit on the straight stock rail side is placed and spiked to true line without reference to the opposite rail. The existing rail on the opposite side is then removed and the new unit on that side, composed of the bent stock rail, straight point, straight lead rails and frog is lined into position.

After this unit has been spiked down to correct gage, the curved lead is placed. In spiking this lead the utmost care must be taken to locate and spike first those locations indicated on the standard plans, in the off-sets from the straight lead or the mid-ordinates, as the case may be. These measurements must be accurately made in order to avoid an uneven curve, with its points of sharpness receiving the maximum wear.

Since gage through the switch points is not always correct, it is good practice to check the gage through the switch to determine any tight spots, correcting same by adjustment of the switch braces. Undercut stock rails and points should be used in all high-speed turnouts, to prevent the initial shock being transmitted to the switch rail at the actual point of switch. Such housing results in a much longer life of the points by moving the initial thrust approximately six inches back on the point to much heavier material.

Your committee is of the opinion that, in order to hold stock rails firmly in place, all slide plates should be provided with adjustable braces of standard design, and should be fastened to the ties by lag screws. Many of us also recommend that the frog be held in place by hook plates, rather than the present conventional plate which is riveted to the frog. These conventional plates soon become loose due to wearing out of the rivets, and permit the frog to be pulled loose in the spikes. This, in turn, results in the spike killing of the ties under the frog due to respiking. Consideration should be given to double-spiking lead rails on the inside, with the plates lagged to the ties by means of lag screws or hold-down spikes. In all high-speed turnouts it is, of course, essential that rigid frogs be used, preferably with a manganese insert point.

Maintenance

Switches in high-speed turnouts, electrically or mechanically operated, and spring switches, require close supervision of their maintenance to insure their successful operation. The primary considerations, of course, are line, surface and gage, but regardless of how perfectly these are maintained, successful operation cannot be assured if the turnout is not anchored firmly enough to prevent the rail from running. Such anchoring may be done several ways, and the committee makes no specific recommendations thereto, except that sufficient anchorage should be provided, starting ahead of the switch and extending beyond the frog to prevent any possibility of movement under traffic.

The turnout, because of its many parts and the thrust upon it, together with its more frequent joints, requires more care than does the adjacent track structure.

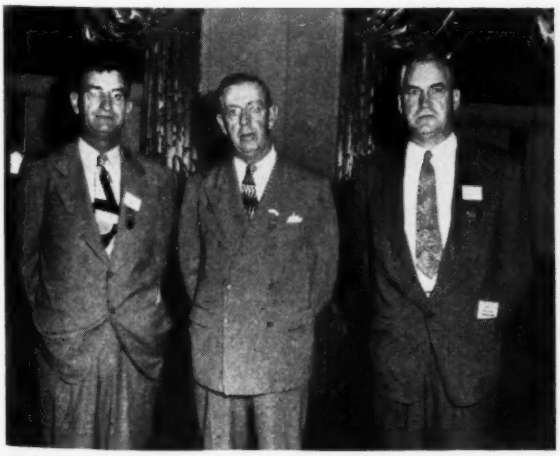
ROADMASTERS

Drainage must be kept open at all times and the ballast clean. Bolts must be tight and any variation of gage must be corrected immediately. Switch points, frog and stock rails must be inspected closely for flow of metal and all such flow must be removed by grinding.

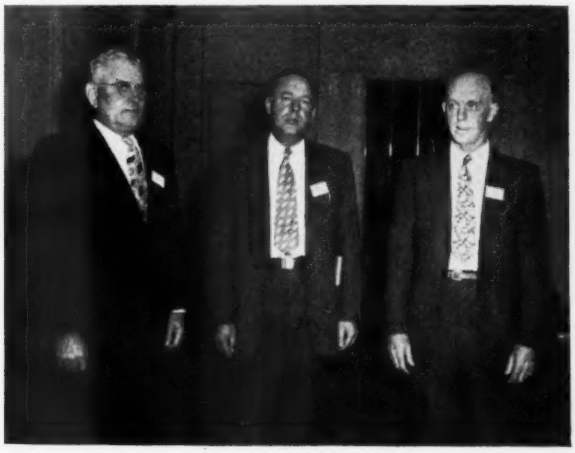
In the case of manganese insert frogs, it is essential that a groove be provided between the insert and its binding rails to receive the flow of metal and prevent chipping. All joints should have the rail ends cross-ground at the time of installation to receive the flow of metal and any flowed metal should be very carefully watched and removed by cross-grinding prior to its reaching the chipping stage.

It will not take long to learn the amount of time that may elapse between periodic inspections and grinding. Changes in the amount of traffic should be carefully noted for they have a direct bearing on the frequency of inspection required to determine when grinding is necessary. It is far more economical to grind off this flow a little oftener than actually required than miss one inspection and find the delay has permitted some chipping to take place. To fail to prevent chipping will require the building up of rail ends, and in many cases may require the removal of rails, frogs, points and knuckle rails. Manganese frogs and knuckle rails should be watched carefully for any metal flow. If any flow develops it should be ground off, and the units carried as long as possible before being built up. By this means, the units can be carried safely for longer periods between building-up operations. Once these parts are built up, it will be necessary to grind off flow from them at more frequent intervals in order to avoid the chipping out of metal.

The following items of inspection and correction, taken at the proper time, will



Three Past Presidents of the Roadmasters' Association: (Left to Right) E. L. Banion, Gen. Insp. Track, A.T.&S.F., Topeka, Kan.; E. E. Crowley, Rdm., D. & H., Albany, N.Y., Treasurer of the Association; and A. B. Hillman, Engr. M. of W., C.&W.I., Chicago



The New Haven Group at the Roadmasters' Convention Included These Track Supervisors: (Left to Right) J. M. Reardon, Hartford, Conn.; W. W. Chaffee, Guilford, Conn.; and W. H. Haggerty, New Rochelle, N.Y.

result in a properly-maintained turnout for a much longer life, and at the same time provide safe and economical operation:

Keep drainage system functioning properly.
Keep ballast cleaned throughout the turnout and vicinity.
Keep well oiled.
Keep bolts, braces, rods and all fittings tight and in place.
Maintain proper tension on spring switches.
Ties properly spaced.
Cross-level, surface, line and gage to be as nearly perfect as possible.
Guard rails at the proper gage, with sufficient back-to-back clearance for free passage of wheel flanges.
Flow of metal removed from frogs, points, stock rails and knuckle rails.
By all means keep track properly anchored.

Winter maintenance in the northern climates is a problem for all types of switches, but especially so for power-operated and spring switches. In the fall each turnout should be checked closely for line, surface and gage, and any variation corrected. Ballast should be cleaned out from between ties under the points and guard rails to a depth of about one inch above the bottoms of the ties; drainage should be given careful consideration around the switch and throughout the entire turnout at this time. When this work has been completed an inspection should be made by the roadmaster or track supervisor, in company with the signal supervisor, maintainer and track foreman, to determine the conditions and know that the turnout is in proper condition for winter operation. The adjustment of points should be checked and the proper amount of tolerance made at this time, so that when sudden changes occur in temperature, the signal circuit will not be adversely affected.

During snow storms it is necessary that special precautions be taken or there is sure to be trouble. There are several types of switch heaters on the market, which have been used with considerable success in terminals and at other locations where the speed of trains is not too high. These have proven economical at such points; however, the ties must be protected by asbestos pads, and the heaters must not be left unattended at outlying switches. Where switches are located out in the country or at outlying points, a small shanty, equipped with stove and a dispatcher's telephone, should be provided. In case of a storm a man should be sent to each of these switches, and when he arrives he should report to the dispatcher that he is on duty and will keep his switch in operating condition until he is relieved or the storm is over. This system results in considerable overtime, but, in heavy-traffic territory, it results in a considerable saving, due to holding train delays to a minimum.

Committee Personnel

R. E. Meyer (chairman), rdm., C.&N.W., Sterling, Ill.; F. W. Tomlinson, Jr. (vice-chairman), assoc. ed., *Railway Engineering & Maintenance*, Chicago; J. M. Miller (vice-chairman), supt., W.M., Cumberland, Md.; C. C. Bell, rdm., S.P., Tucumcari, N.M.; R. D. Bisbee, rdm., A.T.&S.F., Woodward, Okla.; P. H. Collins, rdm., S.P., Dunsmuir, Cal.; M. G. Counter, rdm., C.B.&Q., Lincoln, Nebr.; M. L. Denny, trk. supvr., Ind. Union, Indianapolis, Ind.; F. L. Etchison, engr. m.w., A.C.L., Savannah, Ga.; C. G. Grove, ch. engr., m.w., P.R.R. Chicago; Wm. Hogan, supvr. (retired) B.&O.C.T., Chicago; R. P. Johns, rdm., C.B.&Q., Beardstown, Ill.; H. W. Kellog, div. engr., P.M., Detroit, Mich.; W. Lakoski, div. engr., C.M.St.P. &P., LaCrosse, Wis.; H. T. McManus, rdm., S.A.L., Hamlet, S.C.; J. J. Metzger, P.&M. Company, St. Louis, Mo.; J. C. Runyon, supvr. trk., C.&O., Covington, Ky.; J. D. Shelton, rdm., S.P., Martinex, Cal.; G. J. Slibeck, engr. trk. sales, Pettibone Mulliken Corp., Chicago and M. P. Whitman, trk. supvr., W. of A., Montgomery, Ala.

Discussion

E. L. Banion (A. T. & S. F.) opened the discussion by expressing the opinion that there is a need for establishing definite wear limits for the parts contained in high-speed turnouts, stating that the switch points present a hazard when they become worn beyond a certain point. In addition, Mr. Banion suggested widening the gage through the lead and guard rails of the sharper turnouts, specifically mentioning that the gage of turnouts with No. 10 frogs should be ¼ in. wide. The use of switch-point guard rails should also aid in protecting curved points and are widely used by his company with great success.

Commenting on Mr. Banion's remarks, President Brown expressed the opinion that there would be a wide variation of ideas in arriving at a wear limit. Mr. Banion, explaining that his road had no set standard for the permissible limit of wear, said that there should be a means of determining when to renew material or at what limit of wear failure could be expected.

D. E. Cowell (Reading) raised the question as to whether, when renewing a turnout, the switch timbers or the steel should be installed first. His opinion is that when the switch timbers are renewed first the results are detrimental because of the need for a second spiking. Chairman Meyer stated that the method to be used is largely a matter of choice, but in his opinion the unfavorable effects of the re-spiking of the new ties required when the switch timbers are installed in advance of the new steel, is more than off-set by the good surface and foundation that are obtained when the steel is installed first.

Two Supply Associations Held Record Joint Exhibit at Conventions

EQUIPMENT, materials, devices and services, attractively displayed by the 96 companies participating in the second joint exhibit of the Track Supply Association and the Bridge and Building Supply Men's Association, drew the interested attention of all in attendance at the concurrent conventions of the Roadmasters' and Maintenance of way Association and the American Railway Bridge and Building Association held at the Hotel Stevens, Chicago, September 16-18. Opening the day before the convention, with six more companies participating than last year, the exhibit closed with the convention on September 18.

The officers of the Track Supply Association who were responsible for the planning and conduct of the track portion of the exhibit this year were: President, H. M. McFarlane, O. F. Jordan Company, East Chicago, Ind.; first vice-president, J. B. Templeton, Templeton, Kenly & Co., Chicago; second vice-president, Kenneth Cavins, Fairmont Railway Motors, Inc., Chicago; and secretary-treasurer, Lewis Thomas, Q & C Co., Chicago. Directors of the association were: E. J. Brown, engineer of track, Burlington Lines (honorary), Chicago; H. C. Hickey, Rail Joint Company, Chicago (ex-officio); W. A. Enstrom, Pettibone Mulliken Corporation, Chicago; G. W. Morrow, Worthington Pump & Machinery Corp., Chicago; W. A. Peck, The Rails Company, Chicago; R. W. Torbert, Oxweld Railroad Service Company, Chicago; J. F. Van Nort, Duff-Norton Manufacturing Company, Chicago; and Edward Wray, Railway Purchases and Stores, Chicago.

The officers of the Bridge and Building Supply Men's Association who arranged for the exhibits of the members of their association were: President, W. Lyle McDaniel, Massey Concrete Products Company, Chicago; vice-president, Howard Mull, Warren Tool Corporation, Chicago; treasurer, G. R. Betts, Armco Drainage & Metal Products, Inc., Chicago; secretary, E. C. Gunther, Duff-Norton Manufacturing Company, Chicago. The directors were: G. B. Coffey, A. M. Byers Company, Chicago (honorary); C. E. Croisant, The Lehon Company, Chicago; S. W. Hickey, *Railway Engineering & Maintenance*, Chicago; G. W. Morrow, Worthington Pump & Machinery Corp., Chicago; L. R. Robinson, Pittsburgh Pipe Cleaner Company, Pittsburgh, Pa.; and R. W. Torbert, Oxweld Railroad Service Company, Chicago.

New Officers

In the election of officers of the Track Supply Association, which was held on Thursday, September 18, just prior to the closing of the exhibit, Mr. Templeton was advanced to president, and Mr. Cavins to first vice-president; Mr. Torbert was transferred to second vice-president, and Mr. Thomas was re-elected secretary. New di-

rectors elected for a term of two years were: S. W. Hickey; S. D. Means, R. G. Le-Tourneau, Inc., Peoria, Ill.; and W. A. Maxwell, American Brake Shoe Company, Ramapo Ajax Division, Chicago.

In the election of officers of the Bridge and Building Supply Men's Association, Mr. Mull was raised to president; Mr. Betts was elected vice-president; Mr. Gunther was re-elected secretary; and S. W. Hickey was elected treasurer. The new directors, elected to terms expiring in 1950, were: R. R. Clegg, American Lumber & Treating Co., Chicago; and H. R. Deubel, Chicago Pneumatic Tool Company, Chicago. Mr. McDaniel becomes an honorary director.

A list of the exhibiting companies, the names of their representatives present, and the products on display follows:

Achuff Railway Supply Company, St. Louis, Mo.—rail anchor, spring washer, lubricator, tie-saver track pad; G. W. Achuff, H. G. Rowe, A. M. Wells.

Air Reduction Sales Company, New York—welding equipment, welding and cutting torches, cutting machine, portable rail cropping machine, cylinders of welding and rare gases; C. B. Armstrong, L. D. Brennon, N. C. Brink, C. A. Daley, J. M. Driscoll, H. A. Hocking, W. S. Hopkins, Jr., J. W. Kenefic, L. C. McDowell, U. F. Portell, H. V. H. Stewart, E. F. Turner, D. J. Williams.

American Brake Shoe Company, Ramapo Ajax Division, Chicago—rail lubricator, switch stands, adjustable rail brace; G. A. Carlson, R. Carmichael, C. P. Corrigan, E. E. Dailey, C. E. Godfrey, H. Hazelton, A. F. Hess, D. F. Hilton, J. V. Houston, A. F. Huber, J. S. Hutchins, J. P. Kleinkort, O. F. Magnus, W. A. Maxwell, James McComb, W. C. Muller, E. F. Needham.

The American Fork & Hoe Company, Cleveland, Ohio—rail anchors, tapered rail-joint shims, safety rail fork; C. C. Connolly, W. E. Kelly, J. J. Nolan, D. L. O'Brien, Frank J. Reagan, John Skeel, R. J. Whalen.

American Lumber & Treating Company, Chicago—photographs; R. R. Clegg, F. W. Gottschalk, Henry Garnjobst, R. B. Putnam.

Armco Drainage & Metal Products, Inc., Middletown, Ohio—motor car shed, multi-plate pipe, tunnel liner plate, sheeting, perforated pipe, asbestos-bonded pipe, spiral welded pipe piling; C. H. Anderson, A. H. Baldwin, G. R. Betts, H. S. Claybaugh, E. T. Cross, J. D. Faylor, N. A. Powell, W. B. Roof, W. H. Spindler, Felix Truss.

Austin-Western Company, Aurora, Ill.—air-operated working model of 30 yd. drop-door automatic dump car, photographs; Jess Mossgrove.

Barco Manufacturing Company, Chicago—tie tampers, portable driller, portable gas hammer; F. H. Bard, W. J. Behlke, R. F. Ingebretsen, C. O. Jenista, W. T. Jones, L. J. Lytle, J. L. McLean, C. L. Mellor, W. B. Miller.

Bernuth Lembcke Company, Inc., New York—models of elastic rail spike, tie-plate anchor spike, elastic rail spike, clamp plate; Wm. A. Fisher, A. C. Jack, B. Kuckuck.

The Buda Company, Harvey, Ill.—power track drill, chore boy, jacks, crossing gates, aluminum track jacks, bonding drill, earth drill; J. W. Biety, E. J. Broholm, C. R. Burke, H. H. Cohenour, R. B. Fisher, W. A. Hart, C. Leetz, R. R. Mangan, R. J. Mulroney, D. Richards, J. W. Sanford, C. W. Smith, M. J. Rotroff, R. P. Williamson, H. A. Wolfe.

Caterpillar Tractor Company, Peoria, Ill.—interchangeable parts display, cut-away display; W. H. Hogan, H. J. Hunkele, F. E. Schaumberg, F. W. Vigneault, Jr.

Chicago Pneumatic Tool Company, New York—pneumatic tools, electric tools, gasoline tie tamper, air compressors; C. L. Butler, A. J. Chevalier, S. A. Congdon, H. R. Deubel, J. E. Hopping, W. Pallowick, E. S. Rosselle.

Chipman Chemical Company, Inc., Bound Brook, N. J.—de-icing and weed-killing compounds; M. De Coninck, L. A. Elson, C. S. Langdon, N. J. Leavitt, W. H. Moyer, J. G. Murawski, A. J. Reading, W. Sawka.

City Sales Company, Chicago—weed mower; R. F. Lindrooth.

Conley Frog & Switch Co., Memphis, Tenn.—manganese spring frogs, manganese expansion rails for movable bridges, end-rails for turntables; R. T. Reilly, W. A. Summerhays.

Crerar, Adams & Co., Chicago—track tools, fire extinguisher, crayons, track and bonding drills; R. W. Besant, T. J. Connally, Geo. J. Doyle, O. C. Liesendahl, H. C. White.

Cullen-Friestedt Company, Chicago—motion pictures of cranes and rail tongs; W. C. Bamber, L. B. Bertaux, C. J. Bronez, E. V. Cullen, F. P. Cullen, C. G. Edwards, T. G. Frazee, K. J. Huybers, Jos. F. Leonard, D. L. O'Brien, G. G. Prest, W. J. Roehl, George Rumble.

Dapco Products, Inc., Defiance, Ohio—portable air compressors, paint spray gun, lubricating gun; George Deitrich, E. T. Smith.

Dearborn Chemical Company, Chicago—rust preventive, rust preventive wrapper, sealing compound; D. B. Bishop, H. E. Johnston, D. D. Powers, C. C. Rausch.

Drinkwater, Inc., Waukegan, Ill.—flexible pipe couplings, plans of couplings and gaskets, rubber gaskets, comparison of properties of natural and synthetic rubber, large illustrations of application, literature; M. S. Drinkwater, Charles M. Drinkwater, Jr., P. H. Eagon, E. E. Kahila, Fred E. Kreglow, J. R. Montgomery.

The Duff-Norton Manufacturing Company, Pittsburgh, Pa.—track jacks, ball-bearing screw jacks, hydraulic jacks, journal jacks, automatic lowering jacks; D. F. Evans, E. C. Gunther, W. W. Moody, J. F. Van Nort.

Electric Tamper & Equipment Co., Ludington, Mich.—electric tamping equipment, electric concrete vibrator, vibratory soil compactor, gasoline engines, concrete vibrator; H. W. Cutshall, A. W. Davis, Adrian del Paso, Jr., C. J. Derler, M. D. Hall, G. H. Haywood, J. F. Hensel, R. F. Hermann, A. B. Holt, C. Jackson, Wm. B. Joyce, J. T. Lydon, George J. Morris, L. S. Osborn, H. D. Piper, R. W. Purdy, J. M. Webb, M. S. Westlund.

Fairbanks, Morse & Co., Chicago—motor car, engine generator, portable electric lanterns, demountable hub wheels; E. C. Golladay, R. F. Lane, J. F. Marquitz, W. L. Nies, C. B. O'Neil, C. A. Rauch, N. A. Sproesser.

Fairmont Railway Motors, Inc., Fairmont, Minn.—inspection, section and gang motor cars, grouting equipment; George F. Adams, Clyde P. Benning, C. W. Brhel, W. D. Brooks, Kenneth Cavins, C. J. Dammann, C. H. Johnson, W. F. Kasper, Charles Rager, W. H. Ripken, Harmon Sly, R. W. Stenzel, W. M. Williamson.

Gradall Division, Warner & Swasey Company, Cleveland, Ohio—motion pictures of grading machine in action; S. F. Beatty, Jr., Koop Ferwerda, Ray Ferwerda, F. M. Paul.

Gravely Ia-Nois, Inc., Davenport, Iowa—utility tractor; Don Klein, H. W. Klein, Eugene Sawyer.

Hastings Signal & Equipment Co., Boston, Mass.—overhead bridge and tunnel warnings, side clearance warnings, literature; Elmer G. Rogers, Marshall J. Ross and B. S. Snow.

Hayes Track Appliance Company, Richmond, Ind.—photographs; Brice E. Hayes, Winchell Hayes, Herbert J. Mayer.

Homelite Corporation, Port Chester, N. Y.—portable pumps, generators and blowers, one-man high-cycle electric chain saw; K. J. Clapp, P. R. Corbett, E. M. Gramm, T. W. Gramm, L. W. Kerr, Leon Neimic, Robt. Straetz, Nelson Thompson.

Hose Accessories Company, Philadelphia, Pa.—high and low pressure hose couplings, literature; George A. Allen, A. T. Dewees.

Hubbard & Company, Unit Rail Anchor Company, Inc., Chicago—photographs; A. L. Fridley, J. H. Hines, N. A. Howell, A. C. Laessig.

Illinois Malleable Iron Company, Chicago—rail anchors; Albert Ericson, Chas. G. Erickson, Dayton T. Hogg, Eugene C. Mann, Lloyd O. Stratton.

Independent Pneumatic Tool Company, Chicago—pneumatic and electric drills, grinders, nut runners, hammers, paving breakers, rock drills, saws, impact wrenches; J. F. Corkery, D. Gibbons, J. A. Hill, B. H. Johns, W. A. Nugent, D. E. Randall, R. Schafer, F. J. Schiel, C. B. Sexton, Mark Sorensen, R. A. Sward, George Thoma.

Ingersoll-Rand Company, New York—tie tampers, compressors, spike drivers, pneumatic tools and rock drill equipment; R. C. Baldwin, G. H. Brahler, J. Hanson, E. L. Hawes, H. L. Kent, R. Moon, T. Wiegand.

Jaeger Machine Company, Columbus, Ohio—air compressors, concrete mixers, pumps; V. G. Mandt, R. Masters, R. McLean, J. Nolan, J. H. Yearling.

Johns-Manville, New York—samples, pictorial display of corrugated-asbestos shingles, transite pipe, asbestos roofs, transite smoke jacks; C. E. Bryant, Jr., Geo. J. Campbell, Geo. E. Hall, H. J. Landis, W. G. Morehead, R. J. Offutt, Thomas O'Leary, A. C. Pickett, W. W. Prosser, P. E. Redding, F. C. Vandervort, L. T. Youhn.

O. F. Jordan Company, East Chicago, Ind.—model of spreader-ditcher, photographs; J. P. Bowers, J. J. Dudzinski, L. J. Emmerling, J. C. Forbes, W. B. Joyce, H. M. McFarlane, W. J. Riley, Wm. Riley, C. W. Shipley.

The Joyce-Cridland Company, Dayton, Ohio—automatic lowering jacks, track jacks, bridge jacks, journal jacks, air-operated jacks; John N. Miller, Dave Stockman, C. N. Thulin.

Kalamazoo Manufacturing Company, Kalamazoo, Mich.—motor engine, transmission, motor car equipped with electric generator, electric drill, electric saw, floodlights, electric nut runner, track wheels, track gage, track level; Laurance Boswell, Geo. W. Hoover, R. E. Keller, Geo. E. Monroe, Howard Mull, P. J. Robischung, Lloyd Stratton, Henry Vogel, O. M. Youngquist.

ROADMASTERS

H. M. McFarlane
President

Lewis Thomas
Secretary

Track Supply Association

W. Lyle McDaniel
President

E. C. Gunther
Secretary

Bridge and Building Supply Men's Association

The Kershaw Company, Inc., Montgomery, Ala.—wheel-type cribber, auger-type cribber, rail derrick, spike-setter carriage, ballast plow, track dresser; Adrian del Paso, O. B. Duncan, John P. Crow, W. D. Hoffman, W. B. Joyce, Knox Kershaw, Royce Kershaw, J. F. Leonard, W. J. Roehl, H. H. Williams.

Koehring Company, Milwaukee, Wis.—photographs of crane car, crawler crane; E. J. Goes, John Poulter, J. F. Robbins, J. R. Steelman, R. E. Stewart.

The Lehon Company, Chicago—smooth and slate-surfaced asphalt roll roofing and shingles, cold-process roofs, waterproof felts, papers and fabrics, asphalt roof coatings, paint and cements, asphalt built-up roofs, waterproofing fabrics, felts and asphalts for bridge waterproofings; T. L. Connolly, C. E. Croisant, J. E. Eipper, Tom Lehon, A. C. Senseney, John W. Shoop.

LeRoi Company, Chicago — tractor-mounted compressor, coupled to 60 c.f.m. trailer compressor, right-of-way mower, gasoline engine, air tools; A. J. Bartlett, Jr., R. E. Bell, C. W. Brown, J. H. Callahan, F. W. Cross, G. M. Dallas, R. M. Darr, J. G. Dean, J. M. Dolan, James T. Flynn, K. E. Gifford, Donald J. Hogan, George M. Hogan, J. E. Hogan, D. L. O'Brien, J. J. O'Brien, N. M. Sedgwick, S. H. Smith, L. O. Stratton, G. C. Weber.

Lima Locomotive Works, Lima, Ohio—displays showing the application of shovels, cranes and draglines to maintenance of way work; M. K. Tate, Roy Wills, E. E. Worrell.

Link-Belt Speeder Corporation, Chicago—motion pictures and color photographs of shovel, cranes and draglines in operation; R. B. Barnes, K. R. Merrick, G. H. Olson.

Littleford Bros., Inc., Cincinnati, Ohio—crossing and platform roller; R. S. Arthur, D. D. Carter, L. W. Glaser.

The Lundie Engineering Corporation, New York—tie plates, rail lubricators, tie tongs; L. B. Armstrong, J. P. Armstrong, Charles Stone.

R. G. LeTourneau, Inc., Peoria, Ill.—high-speed, rubber-tired Tournapull; high-speed, rubber-tired Tournadozer; R. W. Burke, C. D. Fey, S. D. Means, R. P. Nichols, V. E. Pray, H. R. Powers, Keith Thompson, A. A. Tyrie, E. E. Weyeneth, W. B. Worden.

Maintenance Equipment Company, Chicago—rail and flange lubricator, switch-point protector, derail, photos of lubricators and rail layer; A. M. Heun, E. Overmier, T. E. Rodman and P. J. Wolfe.

Mack Welding Company, Duluth, Minn.—hand tongs; Charles McElderry, M. M. McElderry, Wm. R. McElderry.

Mall Tool Company, Chicago, Ill.—rail drill attachment, flexible-shaft rail grinder, pneumatic chain saw, electric chain saw, electric drills, gasoline engine, circular saws, gasoline-powered vibrators; Earl W. Bettis, Howard Constant, H. Fred Jorgesen, E. M. Larson, A. W. Mall, Fred McGonigle, M. Rehnquist, R. Schwass, W. Hol. Slutz, C. K. Smith, D. Soderberg, John N. Thorp.

Marvel Equipment Company, Chicago—track liners, electric, oil, gas and propane switch heaters, mowers, snow plows; A. M. Andersen, T. C. Coleman, Blake Howard, Fred Jorgensen, O. E. Quinton, J. N. Thorp.

Massey Concrete Products Co., Chicago—photographs; Ross Clarke, W. Lyle McDaniel.

Modern Railroads Publishing Co., Chicago, Ill.—copies of magazines; Roy Gurley, Paul Jackson, Frank Richter, Jack Rockwell, D. R. Watson.

The Master Builders Company, Cleveland 3, Ohio—treatments for concrete and mortar; V. S. Andrews, C. H. Borcherding, D. Burkhardt, J. Fellabaum, A. S. Holway, W. Jaros, C. A. Lyon, F. W. Scripture, B. R. Wood.

Nordberg Manufacturing Company, Milwaukee, Wis.—rail drill (new model), spike hammer, track gager, grinders, midget grinder; Dave Anderson, W. B. Blix, L. P. Brassy, George M. Cooper, George M. Dallas, J. R. Graham, Stan H. Haigh, James F. Hartley, John E. Hogan, W. S. Isaacs, Clyde K. Jensch, Eugene Larson, Ralph W. Payne, H. W. Protzeller, Will H. Reaves, J. W. Samson, Stanley H. Smith, Lloyd O. Stratton, H. H. Talboys, L. D. Whitaker, W. Conroy Wilson.

Morden Frog & Crossing Works, Chicago—rail braces and split switch parts; W. Homer Hartz, W. Homer Hartz, Jr., Geo. F. Killmer and Lyle I. Martin.

Morrison Railway Supply Corporation, Buffalo, N. Y.—photographs, switch-point guard, adjustable gauge holder; J. J. Desmond, George J. Diver, David Vogel.

Murdock Manufacturing & Supply Co., Cincinnati, Ohio—check valves, air valves, drinking fountains, water service fixtures, post-type hydrant, railroad water service boxes, hydrants, street washers, diesel watering boxes, railroad specialty items; E. Leroy, J. Kelso Murdock, Robt. J. Murdock, H. F. Oswald.

Northwestern Motor Company, Eau Claire, Wis.—motor cars, rail slotter, rail surface grinder; M. W. Allen, F. W. Anderson, E. J. Baker, B. Beven, B. Church, W. Church, Otis B. Duncan, W. H. Haas, Wm. B. Joyce, C. E. Murphy, T. Murphy, J. Neimeyer, A. H. Nelson, George G. Prest, L. Roehl, Wm. J. Roehl.

Oliver Iron & Steel Corporation, Pittsburgh, Pa.—track bolts, frog bolts, switch bolts, heel-block bolts, gauge rods, screw spikes, drive spikes, nuts, timber grips, eye bolts, machine bolts, carriage bolts, lag screws, rivets, hook bolts, small forgings; J. C. Cullinan, C. H. Reymer, Edward M. Welty, Carl Wingerson.

Overhead Door Corporation Hartford City, Ind.—working model of overhead door; Robert E. Myers, Wm. B. Rosenbaum.

Owens-Illinois Glass Company, Toledo, Ohio—glass blocks; K. H. Cunningham, H. C. Fowler, E. P. Lockart, H. W. Paul, R. T. Whalen.

The Oxweld Railroad Service Company, Chicago—photo-mural showing set-up for pressure-welding continuous stretches of rail, section of welded rail removed from track after eight years of service, chart showing the extent of use of welded rail on 26 roads; Lem Adams, G. P. Bogert, Bob Boyle, M. Burnett, Jr., W. E. Campbell, F. J. Duffie, H. V. Gigandet, F. J. Graham, E. B. Hall, Jr., F. C. Hasse, W. A. Hogan, P. Hunter, Jr., M. E. Keith, J. W. Lacey, P. T. McKinney, H. R. Miller, R. J. Nenneman, D. H. Pittman, J. H. Rodger, K. I. Thompson, R. W. Torbert, Steve Toth, J. E. Winslow.

The P. & M. Co., Chicago—rail anchors; William Garrity, Geo. E. Johnson, John E. Mahoney, C. J. Miller, P. J. Moore, Jr., R. W. Payne, Max K. Ruppert, R. C. Shulze.

Pettibone Mulliken Corporation, Chicago—cribbing machine, bucket loader, mechanical switchman, spring-switch compression gages, adjustable rail braces, trailing point lock, switch stands, electric locks, rerailers, hydraulic retarders for spring frogs, clamshell bucket; W. F. Brietzke, W. A. Enstrom, L. Kelly, E. C. Phillips, G. J. Slibeck, K. von Kampen, W. E. Weiss.

Pittsburgh Pipe Cleaner Company, Pittsburgh, Pa.—pipe cleaning equipment; E. O. Berger, W. V. Cross, G. N. Kleist, E. C. McFadden, L. R. Robinson, R. T. Ruder.

The Pocket List of Railroad Officials, New York—copies of Pocket List; Harold A. Brown, B. J. Wilson.

Power Ballaster division—Pullman-Standard Car Manufacturing Company, Chicago—moving pictures and photographs of power tamping machine; C. B. Faverty, H. E. G. Mulligan, F. H. Philbrick, H. D. Richardson, Robert Sloan, J. J. Trant, Peter Young.

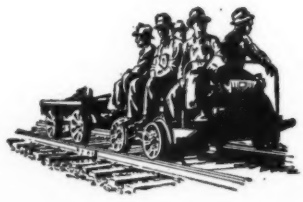
The Q & C Co., New York—switch-point guard, guard-rail clamp, derails, compromise joints, adjustable rail brace, gaging tools, flangeway guard brackets, wheel stops, gage rods; Paul Chynoweth, L. E. Hassman, M. Iseldyke, Jr., G. G. Prest, W. L. Ricker, Lewis Thomas.

Racine Tool & Machine Co., Racine, Wis.—unit tie tampers, portable power rail saws, rail drills, and bonding drills; Geo. W. Achuff, R. E. Bell, Stanley Haigh, R. B. Hill, E. R. Larson, Eugene Larson, E. R. Mason, C. E. Murphy, H. G. Rowe, S. P. Schafer, A. M. Wells.

Railroad Equipment, Chicago—copies of publications; John C. Broderick, Maxwell A. Brown, Robt. M. Clancy, Philip C. Hopkins.

The Rail Joint Company, Inc., New York—standard, insulated and compromise rail joints; W. J. Acker, V. C. Armstrong, Alex Chapman, G. M. Clodfelter, E. A. Condit, H. L. Emerson, R. W. J. Harris, H. C. Hickey, H. L. Lansing, G. H. Larson, J. N. Meade, T. I. Moore, R. W. Payne, Thomas Ryan.

Railroad Products Company, Cincinnati, Ohio—switch stand, pollution-proof coach hydrants, water columns; Otis B. Duncan, Dan J. Higgins, F. J. McDonough, Jas. W. McGarry, George G. Prest, Henry Vogel, Ben Wickmeier.



The Rails Company, New Haven, Conn.—compression rail anchors, M. & L. track construction, automatic switch lock, bridge tie anchor, propane switch heaters, full-throated cut spike, screw spike; R. E. Bell, R. H. Bell, Lester T. Burwell, L. E. Flinn, F. W. Gale, F. W. Holstein, Milburn Moore, W. A. Peck, J. V. Wescott.

Railway Engineering & Maintenance, Chicago—copies of publication; C. M. Burpee, M. H. Dick, R. E. Dove, W. G. Downie, S. W. Hickey, N. D. Howard, P. D. Juraschek, C. R. Knowles, F. C. Koch, J. G. Little, H. E. McCandless, H. H. Melville, C. W. Merriken, Jr., H. E. Michael, G. A. Murphy, Jr., F. W. Smith, F. W. Tomlinson, W. L. Turner, Jr., J. S. Vreeland, J. W. Walton, E. E. Williams.

Railway Purchases and Stores, Chicago—copies of publications; J. P. Murphy, K. F. Sheeran, Edward Wray.

Railway Track-Work Company, Philadelphia, Pa.—rail grinding equipment, rail drill; Wm. D. Hoffman, John B. Moore.

Reade Manufacturing Company, Jersey City, N. J., Harrop Chemical Company, Chicago—railroad weed killing chemicals and spray equipment, gas switch heater, waterproofing compound; D. M. DeWitt, T. Moore, C. A. Parish, Chas. F. Reade, Chas. H. Reade, L. J. Reade, Jack Stazle, W. L. Tanner, O. J. Weber.

Roseman Tractor Mower Company, Evanston, Ill.—tractor with mower, tractor with front-end loader, tractor with rotary sweeper; J. Corzine, J. E. Hoffman, J. A. Roseman, Jr., W. J. Roseman.

Rust-Oleum Corporation, Evanston, Ill.—photos of Rust-Oleum applications; other practical uses; A. B. Arnold, Waldo E. Bugbee, W. J. Church, W. R. Collins, R. A. Fergusson, W. W. Fetner, W. D. Jenkins, E. W. Kush, C. W. Matthews, C. E. Murphy, Frank B. Nugent, R. L. Nutt, Jos. C. Simmons, F. M. Sweeney, J. N. Thorp, F. O. Walsh, Jr., J. M. Welles.

Schramm, Inc., West Chester, Pa.—compressor and pneumatic tools; Fred L. Eckert, Roy Hearl, W. Lake, Gordon Norden, Andrew A. Tyrie.

Sherburne Company, Boston, Mass.—bridge warning device; P. S. Chynoweth.

Sperry Products, Inc., Hoboken, N. J.—literature on detector-car service; model car, samples of rail defects; C. B. Bruse, J. W. Dice, J. W. Dickerson, J. M. Dickey, W. K. Hooper, S. P. Murphy.

Taylor-Colquitt Company, Spartanburg, S. C.—animated display of vapor-drying process, literature; William E. Gadd, D. M. Graves, A. B. Taylor, Jr.

Teleweld, Inc., Chicago—literature on service for railroads; H. E. Finley, O. R. Hansen, C. W. McKee, H. E. McKee, E. J. Payton, J. A. Roche.

Templeton, Kenly & Company, Chicago—track jacks, rail expanders, tie spacers, journal jacks, bridge jacks, hydraulic pullers, track shifters, push and pull jacks, Util-A-Tool aluminum bridge jack stand; R. B. Hill, F. J. Jakoubek, A. C. Lewis, G. G. Prest, L. F. Roehl, E. T. Scott, W. Simpson, Alvin M. Smith, J. B. Templeton.

Thornley Railway Machine Company, Joliet, Ill.—cribbing machine; F. L. McMillan, E. M. Thornley.

Timber Engineering Company, Washington, D. C.—model trusses, model showing timber connector construction, samples of timber connectors; F. E. Carroll, R. L. Fletcher, L. Lohsand.

The Union Metal Manufacturing Co., Canton, Ohio—foundation pilings; J. R. Burkey, M. B. Grant, D. T. Greth, J. W. Lewis.

United Laboratories, Inc., Cleveland, Ohio—samples of flooring material, miniature railway yard, photos, literature, traffic and wear demonstration machine; Geo. T. Lowry, Robert L. Meyer and L. E. Seng.

Warren Tool Corporation, Chicago — claw bars, sledge hammers, track chisels, spike mauls, track tools; Howard Mull, Oscar W. Youngquist.

Woodings-Verona Tool Works, Woodings Forge & Tool Co., Chicago—rail anchors, fixed-tension spring; C. K. Luyster, R. J. McComb, G. L. McKewin, J. M. Moore, Geo. Snyder, W. H. Woodings.

Woolery Machine Company, Minneapolis, Minn.—weed burners, tie cutter; R. J. Moe, H. M. Woolery, W. F. Woolery.

J. A. Zurn Manufacturing Company, Erie, Pa.—coach watering hydrants, back water valves, strainers; Frank J. Seigel, John P. Tansey.

What's the ANSWER?

Repairing Breaks in Welded Rail

How can one most effectively and quickly repair a failure in a stretch of continuous welded rail? Does the type or location of failure make any difference? Explain.

Use Temporary Angle Bars

By R. W. Torbert
Assistant to Vice-President, Oxweld Railroad Service Company, Chicago

Temporary repairs can be made to a failure in a stretch of continuous welded rail by applying angle bars to the area affected in the same manner that such repairs might be made to a conventional rail. If the failure is a transverse fissure or split head, calling for the removal of an entire 39-ft. rail length, this length is cut out with either a portable saw or oxyacetylene cutting blowpipe. A new rail is then inserted and two fusion welds are made in place to which angle bars, or straps, are applied.

Should only a portion of the rail be affected, a shorter piece of rail may be utilized and the same procedure followed. To prevent the rail closing in while repairs are being made, it is essential that the ends of continuous rail that are affected be securely anchored.

Repairs Made in Two Steps

By N. H. Williams
Supervisor Track, Delaware & Hudson, Oneonta, N. Y.

Restoration of service is the primary objective of the maintenance forces when a failure occurs on any type of track. Traffic can be restored on a failed stretch of continuous welded rail faster, using fewer man-hours of labor, than is possible on jointed track. There are two phases to the repairing of a break in a stretch of continuous welded rail: (1) Emergency repairs, and (2) permanent repairs.

The emergency repairs consist of cutting out the defective portion of the rail with an oxyacetylene torch, removing the spring clips and inserting a short closure rail. This emergency rail is from 12 to 15 ft. long, and is drilled for joint bar application. It is placed in the track, the spring clips reapplied, and the joint bars are bolted to it. The holes in the ends of the welded rail are then drilled under traffic and the bars fully bolted. This emergency closure rail has increased the amount of rail in the track by the amount that the break opened up. Therefore, a rise in temperature would produce a concentration of stresses in a short length of rail. Hence, the distance the rail ran through the clips, and the expansion opening caused by the break are noted for use when final repairs are made.

When permanent repairs are made, the torch-cut ends of the welded rail are cropped with a rail saw. Holes, which are the same size as the bolts, are so drilled in the ends of both the welded rail and the permanent closure rail that when angle bars are applied, the rail will be tight and there will be no play in the bars. The closure rail must be exactly the same length, after temperature and cropping correction, as the length of the pieces removed when the emergency repairs were made, but is never permitted to be less than 15 ft. long. The amount of movement through the clips that occurred at the time of the break is corrected by raising the rail temperature by burning snow melting oil to make the rail expand. This enables the "no-stress temperature" of 90 deg. F. to be maintained when the repairs have been completed. The successful maintenance of continuous welded rail depends on the uniformity of stress over a long stretch of the rail.

The type and location of the defect will, of course, make a difference in the method used to repair a failure in

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Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered In December Issue

1. *What are the advantages or disadvantages in having crossties strapped into bundles at the treating plant before being loaded into cars for shipment? Why?*
2. *What are the latest types of heating facilities for use in shops, enginehouses, small stations, etc.? Can any of these be used effectively in combination?*
3. *How important is it that the track forces appreciate the present high cost of materials? How can this information be best disseminated among them?*
4. *When welding steel deck plates to floor beams of bridges in connection with ballast deck construction, what procedure should be followed to prevent the plates from buckling? Explain.*
5. *Under what circumstances, if any, is it advisable to maintain the gage of track narrower than 56½ in.? Why?*
6. *What causes foaming of treated water in locomotive boilers? To what extent is it prevalent? What methods are being followed in its control?*
7. *What is the best method of insuring that track gangs using pneumatic tie tampers will hear whistles warning them of the approach of trains?*
8. *To what extent can radiant heating be used for melting snow on station platforms and driveways? What are the special problems involved? Explain.*

continuous welded rail. A failure in the vicinity of a weld, such as a transverse defect, wheel mark, etc., could not be protected with joint bars without first grinding away the weld metal, while the same defect in the quarter or center of the rail could be fully protected by the application of joint bars. Defective welds, usually the cause of the failure in stretches of continuous welded rail, are repaired by cutting out the weld and inserting a closure rail. These failures generally have been confined to the experimental welds made when the pioneering installation of continuous welded rail was laid.

It has been noticed that there are fewer defects found in continuous welded rail installations than in comparable stretches of jointed track. There are approximately 43 track miles of continuous welded rail on this property which have been in service for a number of years. In this amount of continuous welded rail only one detail fracture has been found and no fissure defects.

Affected by Many Factors

By F. G. Campbell
Chief Engineer, Elgin, Joliet & Eastern, Joliet, Ill.

Methods which might be used in repairing a failure in a stretch of continuous welded rail must depend upon a number of conditions, such as (1) the temperature of the rail at the time the failure occurred and at the time it is repaired; (2) if it is a break, the location of the break in the particular stretch of continuous rail in which it occurred; and (3), to some extent, the type of failure.

Should there be a square break in the rail or a weld failure at temperatures considerably below that at which the rail was originally laid, a wide gap may open up. If the break or failure is a considerable distance from the end of the rail, it could be temporarily repaired by inserting a short piece of rail between two long angle bars.

Permanent repairs of a break or weld should be made by welding. Closure of the gap could be effected by either heating the adjacent rail or waiting until such time as temperatures have risen to a point where closure can be made effectively.

If such a break or joint failure should occur near the end of a length of continuous welded rail the anchorage on the short portion could be removed or loosened and that section driven to closure. If it was welded at that time, it could then be considered a permanent repair, since any stresses which may be set up because of closing the gap in the manner would usually be unimportant.

Other types of failure, such as a split web, head-and-web separation, piped rail, etc., which may be discovered before complete failure takes place, may be repaired by cutting out the defective section and welding in a new piece of rail. This can be done at any temperature provided sufficient anchorage is placed on each side of the section of rail that is to be removed from the track.

Kinked track is a possible failure which is often discussed in connection with continuous welded rail. This type of failure has been extremely rare and I do not believe it will ever occur if the rail is laid at the proper temperature and if it is adequately anchored and ballasted. If such a failure does occur, it will probably be at an extremely high temperature. Under such circumstances it would seem that the only remedy would be to cut out a short section of rail so that the track can be relined and rewelded.

Station Identification Signs

What are the latest developments in station identification signs? What other modern materials are adaptable for this use?

Signs Being Modernized

By J. E. Nielson
Assistant Engineer of Buildings, Chicago, Burlington & Quincy, Chicago

With the rapid advance in railroad modernization, the question of identification signs has not been neglected. This is only natural because the question most often asked in any railroad car is, Where are we? or, What station is this? Many eyes will seek for the answer on the end of the depot, the edge of the canopy, or the face of the station. Thus, the sign identifying the name of a station is the most important primary point of contact between the town, the railroad, and the public.

A suitable sign has great advertising value, but if overdone, as is sometimes the case where the traffic department has been misled by too enthusiastic advice from the trade, it becomes crude or even monstrous. With good taste, an identification sign may greatly enhance the artistic value of a structure and frequently be the focal point of interest. Each installation should be studied separately so as to obtain a design which will harmonize with the architectural treatment of buildings and surroundings.

Most railroads have standardized their signs and lettering, and in the past have adhered quite rigidly to a stereotype treatment without much objection being raised by the architect. Compared with the modernization and streamlining of equipment, the antiquated appearance of many depots stuck out like a sore thumb. Consequently management became more open minded toward modern trends in buildings and in the use of modern materials.

Following this trend we now frequently see identification signs made of separate letters attached to or projecting out from the face of the wall. In some very attractive installations the letters are arranged along the edge of the canopy. As pointed out above, such letters must conform closely to the architectural treatment and the materials of which they are made should be given careful consideration. Block letters of a magnesite composition, such as Tymstone, are durable and effective where a solid effect is desired. When a lighter treatment is called for, metal letters of bronze or aluminum are highly effective. Lately, several manufacturers will furnish a cast aluminum letter having considerable depth. Such letters will help to convey the idea of mass and solidity, particularly if they are placed in a position where a shadow may be thrown against the background. All letters may be furnished enameled in any desired color or with a polished metallic luster. Letters made of plastics have not yet proved themselves. Undoubtedly the future will bring many attractive new materials to our attention.

Developments Are Recent

By B. M. Murdoch
Engineer of Buildings, Illinois Central, Chicago

Generally speaking, there have not been any radical changes in station identification signs over the years. Signs are usually designed and located in accordance with standard practices adopted by the individual railroad, and vary in character and materials according to the type of structure on which they are applied.

The painted wooden sign is the type most generally used, particularly in

the case of smaller stations. Recently, the enameled metal sign has been growing in popularity because it is readily cleaned and presents a better appearance.

On more important stations of masonry construction, signs are often cut in stone and built into the walls of the structure. Raised letters of steel, aluminum, wrought iron, or synthetic stone are available and can be used to good advantage in the architectural treatment of the building by mounting them on the wall.

Where illuminated signs are considered desirable, the general tendency is toward the use of the neon type, which is rapidly replacing the incandescent light for sign illumination. With the increasing popularity and large range of possibilities in the use of plastics, it is quite possible that they will eventually be employed to a great extent in sign work.

Loose Scrap and Usable Material

How essential is it that the right of way be kept free of loose track material and miscellaneous scrap? Where essential or desirable, what are the most effective methods to this end?

Must Be Habitual

By Roadmaster

Like so many of the jobs that are done day after day, the task of keeping the right of way free from loose track material and miscellaneous scrap seems only a chore until carelessness in performing it results in an accident. For it only takes one incident where a trespasser has placed some item of track material on the track, causing delay or perhaps derailment of a train, to make this routine job assume gargantuan importance. Although the accident may have been minor, even a dull imagination can discern its serious possibilities.

The only effective method I have yet devised for being assured of a right of way free of scrap and other track material is eternal vigilance in insisting on good-housekeeping habits on every section. Unless foremen make it habitual, the job of keeping a cleaned up right of way soon leads to carelessness. One can't count on being able to clean up "tomorrow", it must be done today. It is no harder to take released material and scrap back to headquarters to night than it was to bring the new material out this morning.

Hand in hand with habitual good housekeeping on every section goes attention to the details of planning large rail and switch installation jobs. Where trespassing is known to be prevalent, it is best not to deliver the small material until immediately prior to its use. The problem of picking up daily all scrap and small material released from the laying of 200 to 300 rails every day is a large one. Where it is thought to be necessary a watchman is more economical than the cost of overtime.

In any case, the responsibility of keeping the right of way free of loose track material and scrap rests squarely on the roadmaster or supervisor. We may delegate the execution of the task to our foremen, but it is our job to see that the result is continually good, not periodically excellent, and at other times desultory.

Many Reasons to Clean Up

By L. R. Lamport
Engineer of Maintenance, Chicago & North Western, Chicago

The matter of keeping of the right of way free from loose track material and miscellaneous scrap is exceedingly important for a number of reasons. Loose track material and miscellaneous scrap create an unsightly appearance. Such material, either usable or scrap, lying about the right of way is a temptation to children or other irresponsible persons to pick it up and place it where serious consequences might result to passing trains. Material which lies around where it cannot be watched may be pilfered, causing a considerable loss. The loss of new or usable material may cause a serious delay to some important project. Finally, scrap material is very valuable, particularly at present, and should be picked up as promptly as possible for assembly at scrap bins and subsequent shipment to the stores department for disposition.

The most effective method of keeping the right of way free of loose track material and miscellaneous scrap is for the section forces to be continuously alert in picking up all material not immediately needed, whether usable or scrap, and assembling it at their headquarters. It is the duty of the roadmaster to plan his work so that material that is needed for installation on various jobs is not distributed an excessive length of time before he is ready to carry out the particular work in question.

While this work must be primarily controlled by the roadmaster, it is the duty, however, of all maintenance of way supervisory officers to be constantly on the alert to the end that the right of way is kept free from material, of any classification, usable or scrap, that is not needed immediately for the work at hand.

Avoiding Cross Connections

Where water is obtained from a municipal water supply system, how important is it to avoid cross connections at water treating plants? Why? How can this be done?

Prevention Very Important

By E. L. E. Zahm
Water Engineer, Missouri-Kansas-Texas, Parsons, Kan.

Where water is obtained from a municipal or other portable water supply system it is very important that cross connections be avoided in water treating plant installations so that there will be no possibility of contaminating the public water supply through back-siphonage of the treated water. While the amount and type of chemical used in the water treatment process might not be injurious, there is a very distinct possibility that communicable disease organisms will be transferred through the process.

The most desirable installation from a public health standpoint is to run the city water line and a separate chemical discharge line from the water treating plant up over the top of the storage or treating tank, on the outside, and allow the water and chemical to flow to the tank through an air gap. In certain climates this type of installation presents a frost-proofing problem.

There are many installations where the piping is run through the bottom of the tank and such installations can be considered fairly safe, provided the city water line is run to the top of the tank and discharges above high water level. In this case, a leak or break in the portion of the pipe in

the tank would be a possible source of back-siphonage in case of negative pressure in the city system. Some installations have been made with the city line enclosed in another pipe or chamber in order to avoid the above mentioned possibility.

Consideration should also be given to preventing cross connections in the water treating plant itself by admitting the water to the chemical vat through an air gap. The installation of flushing lines to chemical pumps or discharge lines, and other similar arrangements, should be avoided in order to eliminate possible sources of back-siphonage.

Two Ways To Eliminate

By Barton S. Snow
President, T. W. Snow Construction Company, Chicago

Federal, state and municipal public health laws require the elimination of cross connections between municipal water systems and a treating plant or any other industrial process. Where municipal water is used in railroad open-top tanks it is necessary to conduct the water from the supply main below the surface of the ground to a point over the top of the tank so that the water cannot siphon back in case the supply main is ruptured or sections are shut off and drained for repair or cleaning.

There are two methods of taking water from city mains which are common practice, assuming that the treating plant is modern and that it stops and starts automatically. The first is to erect a standpipe outside the tank and over the top, with the discharge end high enough so that no siphon action can occur. In this method the action of high wind in cold weather creates a problem unless a housing is built at the top of the tank and around the standpipe so heat can be applied. Heating this space adequately in cold climates is expensive and difficult. If hydraulic agitation is used in the mixing chamber, the height of discharge above the top of the tank has to be raised several feet. With automatic operation of the treating plant, the standpipe has to be drained automatically when the plant shuts down.

The second procedure is to discharge water into a sump tank within the heated treating plant through a float valve. The water can then be forced into the treating tank near the bottom—or as would be done normally when using an independent source of supply—by means of an electric motor and a centrifugal pump or by a water turbine driving a centrifugal pump. These can be operated automatically with a float or pressure switch. The water turbine can operate only when the pressure of the incoming water exceeds the tank pressure by at least two to one. The cost of operating the water turbine is practically nil and the maintenance is about the same as that of the centrifugal pump.

As plans are made to modernize treating plants in accordance with present-day requirements for boiler water, careful checks should be made to ascertain whether any cross connections do exist. If they do, provision should be made for their elimination when the new work is done.

Best to Provide Air Gaps

By E. M. Grime
Consulting Engineer, St. Paul, Minn.

At those plants where only lime-soda treatment is used to soften the city water to make it fit for use in locomotive boilers, there should be no serious objection to cross connections which may be desired for emergency use. Sufficient lime has been added to such water to kill all harmful bacteria. I recall a plant where cross connections do exist but repeated sanitary tests by state officers over a period of years have always shown the water to be sterile.

The usual difficulty arises from the desire of the water engineer to use some additional refinement in his treating process, aside from the plain lime-soda method. He often finds that small quantities of tannins, phosphates, nitrates or other chemicals improve results. Sanitary engineers, however, usually object to any of these chemicals getting into the drinking water supply. Railway officers should realize that the sanitary engineer cannot be expected to trace the piping of his municipal supply through the details of a railroad treating plant to be sure that no cross connections exist.

To avoid all possibility of contamination of the municipal supply system and keep the good will of the sanitary engineers it is advisable to receive water from the municipal system over the top of a storage tank where there is about a six-inch air gap between the supply line and the treated water. If this is done there is no possibility of back siphonage and can be no basis for criticism.

Causes of Corrugated Rails

How do rails become corrugated? In what way can corrugations be removed effectively? Can they be prevented? If so, how?

Braking May Be The Cause

By W. H. Sparks
General Track Inspector (Retired), Chesapeake & Ohio, Russell, Ky.

It has been my observation that corrugated rails are most likely to be found on tangent track over which passenger trains operate at high speed, and at points where they slow down to conform to speed restrictions on curves ahead of them. As the brakes are applied, the train slows down because of the friction between the wheels and rails. This action of applying the brakes to reduce the speed of the train contributes in some manner to the formation of corrugated rails.

It is seldom, if ever, necessary to remove corrugated rails from track because they have become unsafe. Whenever they are removed, it is usually because of the chattering of passenger equipment which gives such a poor ride and, in turn, helps to make the track lose its surface quickly.

It is hard to say how corrugations can be removed effectively in track, and harder to tell how they can be prevented. Perhaps the efforts of the rail mill people could be directed toward the rolling of rail that would be resistant to the causes of corrugations. Otherwise, the best way to correct the undesirable effect of such rails is to remove and relay them in tracks where they will cause less trouble.

Blames Slipping Drivers

By R. E. Cramer
Special Research Associate Professor, In Charge of Rails Investigation for A.R.E.A., University of Illinois, Urbana, Ill.

First, it seems necessary to tell what corrugation is. The writer has examined a number of corrugated rails in the laboratory. In every case the bright, high spots have been found to be thin layers of hardened steel. This can be determined in track with a file. The dark low spots can be filed, while the bright hard spots cannot be filed. It probably takes some time after the hard spots are formed before there is much difference in height between them and the soft spots. This comes from further flow.

wear, and corrosion of the soft steel between the hard spots. The writer has examined abandoned street car rails which have been left in pavement for a number of years. In such cases the hard spots did not seem to rust as fast as the soft metal, so they stood high in relief above the soft steel. The auto tires kept the hard spots polished brightly.

When examined under a microscope, the hard layers are found to vary from one to five thousandths of an inch in depth. The metallographic structure of the hard layer is martensite which can only be produced in rail steel by its being heated above 1,300 deg. F. and then drastically quenched. Microscopic examination of the surface steel between the hard spots shows that it is ordinary rail steel which has been severely cold worked by the car wheels.

With this knowledge of the nature of corrugation, we are ready to speculate on the question, How do rails become corrugated? The only method known to the writer would be by slipping driving wheels, heating the steel to a quenching temperature, followed by fast cooling by the adjacent cold metal. This happens in driver burns which usually have a thicker layer of hard metal. One important observation which has been reported by several writers is that both rails of the track become corrugated at the same time and the bright spots are opposite each other on the two rails. This indicates slipping drivers.

The important question is, how can corrugation occur almost continuously in long stretches of track? Usually it does not develop until the rails are 5 to 10 years old, although one case has been reported where a short length of corrugation developed two weeks after the new rail was laid. It would seem possible that locomotive drivers could occasionally slip ½ revolution while the locomotive is pulling hard at slow speeds of 15 to 30 m.p.h. We have no proof that this occurs, but it is the only way the writer knows that would heat the rail to a quenching temperature. Continuous hard streaks are very common in rails, especially around signals and yard tracks. These do not attract much attention because they do not become rough to produce "roaring track." Experiments have shown that about ½ revolution of a locomotive driver will produce the thickness of hardened zone found in corrugated rail. Another way for the hard spots to occur intermittently would be for the driver to spin continuously while the locomotive is moving at slow speed and bounce along so the friction was varied and some areas would not be heated to the quenching temperature. After many years the rails could become covered with corrugation over certain stretches of track by either method.

There are two ways to remove corrugation: (1) By grinding off the quenched steel, and (2) by heating to temper it soft enough to flow like the rest of the rail. Special grinding cars have been developed for grinding rails in track. It is necessary to remove all the hardened metal or the corrugation will return very soon after grinding. An oxyacetylene heating torch can be used to heat the bright spots to a blue color and they will disappear in a few days of service. No damage will be done to the soft steel between corrugations by heating it to 800 or 900 deg. F.

Vibrating Wheels at Fault

By H. H. Morgan
Vice-President & Chief Engineer, Robert W. Hunt Company, Chicago

My opinions on the subject of rail corrugation, based on many decades of study and analysis, were presented in a six-page monograph published in Bulletin No. 425 of the American Railway Engineering Association in June-July 1941.

Considerable has been written since that time about rail corrugation, but the only outstanding contribution is one having to do with the elimination, temporarily at least, by gas-flame annealing the high or work-hardened spots, permitting the ironing out of the corrugations. This scheme, developed by the research group of the A.R.E.A., does not prevent subsequent corrugation if the cause is not eliminated. It does, however, prolong the useful life of the rail.

As described in detail in my monograph, mentioned above, I believe that many causes contribute to the type of corrugation that develops uniformly over continuous stretches of tangent track. These are secondary, however, to what may be termed the *basic* cause. This basic cause of rail corrugation is a synchronized vibration of the wheels and the rails and its effect on their contact surfaces. When the character of the equipment and of the track structure are such as to produce the same frequency at a certain speed, a synchronous vibration of the wheel and rail takes place. The result is a substantial increase in the intensity of the pressure between the wheel and the rail. Under normal conditions this pressure is known to be high. Therefore, when it is further increased by synchronous vibration, stresses of such magnitude may be attained as to subject the rail to marked deformation. However, rail becomes corrugated only after repeated passages of equipment, accompanied by the same synchronized vibration.

Apparently, the only practicable means of correcting synchronization on stretches of track that develop corrugation is to stop the tendency to corrugate at an early stage by some adjustment of train speed (or sometimes of the direction of traffic) so that the synchronous condition will not be continuous or persistent.

Preventing Trestle Deck Fires

What are the best methods of protecting open-deck timber trestles from deck fires? Explain. Does the location of the structure make any difference?

Likes Patented Coatings

By Lee Mayfield
Resident Engineer, Missouri Pacific, Houston, Tex.

Water barrels spaced at specified intervals, or thin sheet metal, either wholly or partly covering the deck, are among the oldest methods of fire protection for timber trestles. The barrels, if kept filled and in good condition, will become rather expensive over a period of a few years. The metal covering has a high first cost, and its life is short in territories subject to salty atmosphere or brine drippings. It also seriously interferes with detailed inspection of older structures.

The protection of the deck with a patented heavy-roofing product and pea gravel appears to have excellent possibilities in that it can be applied at a reasonable cost and last an estimated 8 to 10 years. This method of protection consists in applying a thin primer coat, followed by a ⅛-in. thick final coat of the roofing product, into which is embedded clean pea gravel in ⅛-in. to ⅜-in. sizes. The tops of stringers, tops of ties, sides of ties over the stringers, and tops and sides of the guard timbers should be protected. The coatings can be applied by hand with mops or brushes, or it can be sprayed on. We have applied the protection by hand to two trestles with a total length of about 1,800 ft. at a cost of about $1 per lin. ft. of bridge. On another structure, 4,340

ft. long, 970 ft. has been protected, using pump sprays, at a cost of about $0.88 per lin. ft. Material has been ordered to complete this trestle, and since our men are now familiar with the equipment, we expect to finish the protection work at a cost of $0.75 to $0.80 per lin. ft.

The equipment required to spray the two coats of material consists of an air-operated pump placed in a drum of the primer and another in a drum of the heavy final coat, a 100-lb. compressor, and two long air-supply lines connected to spray heads. Each pump, in its turn, operating at 30 to 40 lb. air pressure, forces the material through the supply line to the spray head, where it is atomized by its first contact with the atmosphere. One pump can be used for both coats, but this will require the cleaning of the supply line after each kind of material is used.

All surfaces to be protected should be free from dust, dirt and surface moisture. If the timber is wet, adequate adhesion cannot be obtained and peeling of the material will result. The thin primer coat should be followed by the final coat within 20 to 30 min. The pea gravel should be applied no later than 40 min. after the application of the final coat, and should be tamped or rammed into this coat until it is securely embedded. A short, thin board can be placed against the bottom of the guard rail or ties to form a trough, which, when partly filled with gravel, can be raised, with a slight pressure on the board to embed the stone into the coating on the sides of the timbers. A foreman and five men are all that are required if the compressor can be kept clear of the track, but two additional are required for flagging if it is kept on a push car. The work should be carefully inspected before the gang leaves the site and irregularities corrected. If "bleeding," caused by an excessively heavy final coat, is detected, additional gravel should be applied to absorb it.

Lighted fusees laid on boards that have been given the protection described have burned out without causing any damage to either the protection coat or the boards. Both the primer and final coats have an additional advantage of filling and sealing all cracks in the timber, thereby preventing the entrance of water and consequently prolonging the natural life of the timber.

To determine which structures should be protected from fire and what method of protection to use, it is necessary to consider the location as well as other factors. If a fire should start on a bridge adjacent to or near a heavily traveled highway, it is likely to be detected quickly, and be relatively easy to extinguish by fire departments or other resources. On the other hand, if a structure in an isolated area catches fire, it may burn beyond control before being discovered. Consequently, bridges located in remote places, particularly long ones, should be among the first to be protected, especially if they are located where brakes are applied heavily and hot splinters from brake shoes are likely to fall on the timber deck.

Suggests Iron Coverings

By E. M. Grime
Consulting Engineer, St. Paul, Minn.

Open-deck trestles usually catch fire from cinders dropped by steam locomotives or from red hot slivers breaking off brake shoes. Hence, to cover the entire deck with fireproof material is found to be highly effective.

In some cases it has been deemed sufficient to fasten No. 16 galvanized iron over the entire deck between track rails. A better method is to place such a covering over the full length of each tie and each guard rail, lapping over the edges of the tie about one inch, and covering not only the top but each side of the guard rails. Each stringer and cap should also be fully covered. The covering placed over the caps should be sufficiently wide to include the ends of the sway braces where sparks might lodge.

This type of protection not only makes the deck reasonably fireproof but protects against the weathering action of sunlight and rain. While the additional cost for placing the iron must be considered, this is more than offset by the lengthened life of the timber.

Changes in Design of Buildings

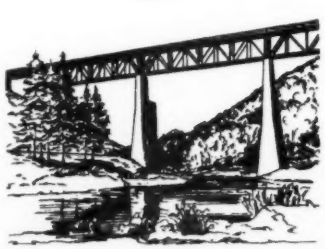
What important changes are being made in the design and construction of sizeable railway buildings because of the continued shortage of some types of materials? Do these present special problems or disadvantages?

Many New Products Used

By B. M. Stephens
Architectural Engineer, Southern Pacific Lines in Texas & Louisiana, Houston, Tex.

From the standpoint of fundamental principles and essentials of design, there have been few changes through the years in the design and construction of sizeable railroad buildings. The advent of heavier steam power, the installation of modern machinery, etc., for the maintenance and construction of rolling stock have, of course, made necessary some modifications with respect to layouts and arrangements of large shop buildings. Basic characteristics of shop buildings, however, have not been too greatly affected by these trends.

The impact upon construction caused by the recent war, and the continuing critical situation with respect to securing building materials normally used in the construction of sizeable railroad buildings, have had some measurable effects upon types of construction. Whereas, in previous years, buildings were generally of the heavy mill-type, constructed of timber, steel frame, or masonry (brick, hollow tile or poured concrete), the shortage of certain building materials has now resulted in the use of substitute materials insofar as possible within design limits. Instead of poured concrete or brick and hollow-tile construction, concrete blocks and other precast concrete products are now coming into general use. Heavy timber framing has been replaced with lighter timbers, the strength of which, either single or in multiple, is fully developed by special fastenings at joints and connections. Heavy mill-type framing has further been replaced by light-weight steel or aluminum.



The shortage of lumber for siding and roof sheathing has resulted in the use of cement-asbestos and gypsum products for such purposes. Among these items are asbestos shingles for roofing and siding, cement-asbestos lumber for siding, and gypsum roof and side-wall plank for roof and side-wall sheathing. Further, considerable use has been made of corrugated cement-asbestos sheets for siding and roofing instead of lumber and corrugated metal.

Glass blocks and corrugated glass sheets are becoming more and more

popular for use in the construction of large buildings where it is not necessary to provide simultaneous light transmission and ventilation. These products serve adequately with respect to providing maximum light transmission, and are good replacement for conventional windows.

The problem for interior and exterior finish is being adequately and economically taken care of by the use of gypsum and cement-asbestos products, structural glass, enameled steel tile, and plywood of various types and kinds.

In many instances it has been possible to solve building requirements by the use of light-weight pre-fabricated metal buildings; either of the frameless type, wherein flanged panels are load carrying members, or of the light-weight steel frame and sheet-metal-covered type. For roof decks and floors, prefabricated steel members have been used successfully.

In the construction of larger railroad buildings, increasing attention is being paid to overall appearance. The use of various special finishes and recently developed paint products makes possible the development of pleasing appearances along good architectural lines, without violating economy of construction to any great extent.

In general, it may be summed up that railroad designing engineers and architects are well abreast of recent trends in the building construction field. As a general rule, railroad structures are not entirely comparable to other industrial or commercial types of construction, due to the fact that railroad structures are designed for specific purposes, which are generally foreign to those encountered in other industries.

Designs Are Functional

By Engineer of Buildings

Railway buildings must necessarily be more or less functional in design. They are built primarily to serve a single, specific railway operation. As such, they do not readily lend themselves to alterations in basic design and hence are pretty much the same as they have been for many years. On the other hand, while the design of each railway building may be basic, its component parts can make use of a variety of materials to serve a common purpose. It is for this reason that changes have occurred in the outward appearance of many railway facilities which help their lack of change in basic design. These changes are not so much a result of continuing shortages of materials as they are a utilization of the benefits of new materials whose effectiveness has been demonstrated both in other industry and by the armed forces.

Advances in air conditioning methods and acoustic materials have permitted the long desirable sealing of many railway structures against the inherent noise of railroading. The reduction of noise has, in turn, made the rise of modern communication facilities, such as talk-back loudspeaker systems, radio, etc., sufficiently effective to indicate their use wherever possible. In such cases, wide windows, glazed with heat-absorbing, glare-reducing glass, have added to the convenience and efficiency of many railway operating offices. The use of glass block has been growing extensively in railway work for enginehouses and shops, and even as decorative light-transmitting elements in other railway buildings.

Structural aluminum is finding wider use on the railroads, and in some ways may be causing slight changes in details, if not in overall design. The same may be said for air-entraining concrete. Pre-cast concrete products are being used more and more—from the roofs of shop buildings to the pedestals of signal relay cases. A recitation of all the many products, either new or recently adapted to railway use, could go on and on, but only prove at its end that the saturation point for new building products for railway building has not been reached, and probably never will be, in spite of the fact that, basically, such buildings must forever remain dedicated to efficient transportation.

Anchoring High-Speed Turnouts

What system of anchoring should be used through high-speed turnouts, especially on C.T.C. territory? What factors are involved?

Must Stop Running of Rail

By W. E. Cornell
Engineer of Track, New York, Chicago & St. Louis, Cleveland, Ohio

Rails through C.T.C. turnouts must be prevented from running, but I am not yet convinced that the correct method of anchoring them has been discovered. We have always used conventional rail anchors of various makes through turnouts. When we began to use C.T.C. on our railroad we added enough anchors to restrict the movement to an amount that would not cause signal failures.

About two years ago, we began experimenting with the use of compression rail clips and now have a few turnouts equipped with them. To date the results of their use have been entirely satisfactory.

Conditions Determine Method

By Signal Engineer

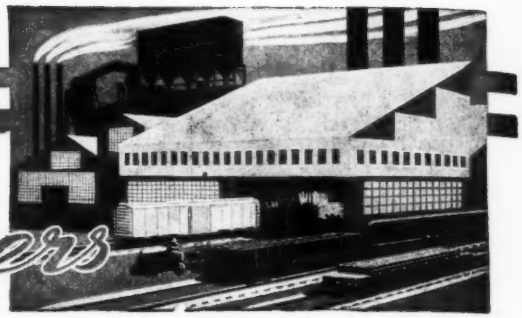
Adequate anchoring of high-speed turnouts, especially in C.T.C. territory, warrants much more attention than most maintenance people give it. To the signal man, upon whom falls the task of compensating for the movement of the rails due to inadequate anchoring, it is not so much a matter of method, but rather the amount of anchoring that is provided. We do not care how the anchors are placed, or what kind are applied, or even how many are used. We only ask that *enough*, of whatever type, are used in such a manner as to reduce the amount the rail runs the minimum. We would even prefer that it did not run at all.

Maintenance standards on our railroad require that turnouts in C.T.C. territory, and where spring switches are in use, be anchored by applying anchors of the compression type on the inside of main track and turnout rails on every tie from the toe of the frog to the point where the switch plates stop back of the heel of switch. In addition, similar anchors are placed on every other tie for four rail lengths back of the frog on the main track and for the same distance ahead of the switch.

On 110-lb. or heavier rail, we find that this arrangement works very well on level track where traffic is directionally well-balanced. Where the preponderance of traffic is in one direction or where the switch is located on an appreciable grade the number of anchors outside the "frog—switch point" limits must be increased to provide additional holding power. Our rail of 110 lb. or heavier is laid on double-shouldered tie plates, which we feel assists in providing anchorage.

Regardless of what maintenance standards may prescribe, if the rail moves back and forth enough to cause signal failures or only enough to require frequent adjustments of locking devices, etc., we feel that enough additional anchors should be added to hold the rail so such movement does not occur.

PRODUCTS of Manufacturers



(For additional information on any of the products described in these columns, use postcards, page 1023)

Lightweight Combination Grinder

THE Mall Tool Company, Chicago, has announced the development of a new, lightweight, combination rail grinder, known as Model No. 603. Weighing only 100 lb., including the power unit and flexible shaft, the new grinder is said to be a multiple-purpose unit for use in railway maintenance, since the work of rail surface grinding, rail drilling, cross grinding, frog and switch grinding and related operations may be done with the same power unit by the use of attachments that may be quickly and easily changed as desired.

This unit includes a welded steel frame, embodying a tool tray, mounted on two insulated rolling rail guides, placed in tandem, with a folding insulated outrigger extending to the opposite rail. The power unit, consisting of a new Mall lightweight two-cycle gasoline engine, is mounted on the frame by means of a 360-deg. swivel base and operates at governed speeds up to 4500 r.p.m., delivering power to a flexible shaft through an automatic clutch.

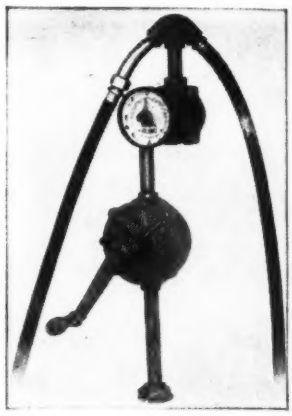
For movement off the track the machine is equipped with a pneumatic-tired wheel at one end, and in this connection the folding outrigger, when in the closed position, serves as a handle for moving the machine with the aid of the pneumatic-tired wheel. A feature of the new unit is a remote control throttle lever, mounted at the shaft take-off, which may be operated from any point along the flexible shaft. Also there is a slip lock detail on the shafting by means of which the changing of attachments is said to be facilitated.

The Mall Model 603 Combination Rail Grinder in Operation

Rotary Fuel Pump

A NEW, meter-equipped, rotary hand pump, known as Fig. 3005, has been announced by Bowser, Inc., Ft. Wayne, Ind. The rotary hand pump on this unit features an aluminum rotor, graphite-carbon vanes, cadmium plated packing nut and stainless steel springs. The meter, which registers to 8 gal., is equipped with a 9,999-gal. totalizer. Other features, include a 40-in. suction pipe with bung attachment, and an 8-ft. oil-resistant discharge hose with aluminum nozzle.

The unit is said to be built for fueling or dispensing liquids up to



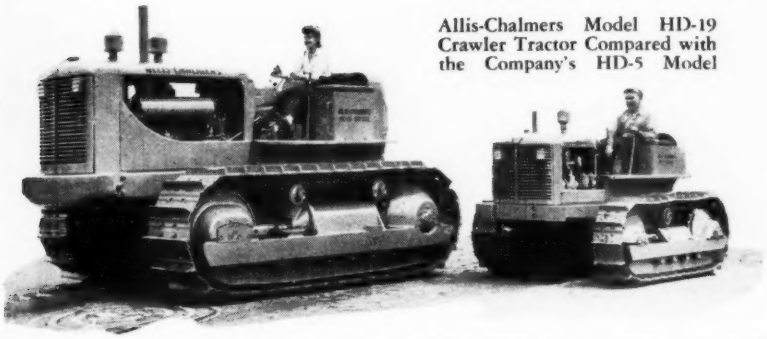
Bower Rotary Pump Fig. 3005

10,000 S.S.U. viscosity from stationary tanks, portable drums or when installed in pipe systems.

Large Crawler Tractor

THE Allis-Chalmers Manufacturing Company, Milwaukee, Wis., has announced production of a new heavy-duty, track-type tractor known as Model HD-19. According to the manufacturer, this tractor, which is said to be the largest crawler tractor made, has been designed and built to offer three major advantages, namely (1) increased capacity and performance, (2) dependability and long life, and (3) improved operator comfort.

Special features claimed for the new tractor include fluid power or Torque-Converter drive, a three-speed transmission, hydraulically-powered steering levers, a track tread of 84 in., and a wide, adjustable operator's seat. The Torque Converter is said to permit the horsepower output of the engine to be held constantly near maximum to reduce shock to the equipment and to eliminate much of the



Allis-Chalmers Model HD-19 Crawler Tractor Compared with the Company's HD-5 Model

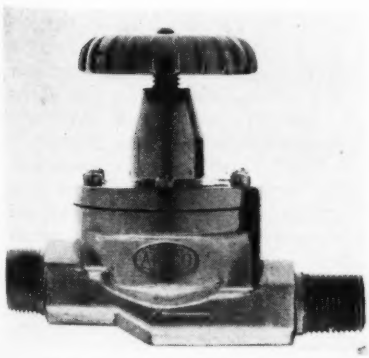
gear shifting normally required, thus minimizing wear and tear on the equipment and reducing operator fatigue. The transmission has only two forward speeds and one in reverse, thus requiring a minimum of gear shifting and resulting, it is said, in stepped up tractor performance and operator efficiency. The hydraulically controlled steering system, which is said to offer finger-tip control, and the large adjustable seat are claimed to contribute greatly to operator efficiency.

The wide track tread plus 8 ft. 10⅝ in. of track on the ground are said to provide good ground contact and balance and reliable traction. In addition, the HD-19 features a ground clearance of 16 in., and is said to afford easy accessability of the clutches and engine, fewer than usual adjusting and greasing points, and longer intervals between servicing due to positive-seal grease-packed truck wheels, idlers and support rollers. The latter are said to require attention only once each 1,000 operating hours.

Station Outlet Valve

THE Air Reduction Sales Company, New York, has announced a new ½-in. station outlet valve of the diaphragm type, which combines the functions of a shut-off valve and check valve in a single unit designed for use on the drops and risers of a piping system. As a shut-off valve, the new unit is said to permit repairs or alterations to be made to equipment down stream from the valve, without disturbing other stations on the line, while as a check valve it permits the flow of gas in only one direction, closing tightly if disturbance at the torch should cause a back-pressure to travel to the valve. This dual function is said to eliminate the necessity of installing separate shut-off and check valves in the line.

Other distinctive features claimed by the manufacturer are as follows: simple and compact construction, with body, bonnet and handwheel of brass forgings; diaphragm-type design, which eliminates packing and stuffing box, thus minimizing possible leaks; the fact that the valve may be dismantled and reassembled easily and rapidly; and the ability to connect several outlets to one drop, thereby making each outlet independent of the others. As an added safety and economy measure, the manufacturer recommends that a plug and chain assembly be provided for use with each station outlet valve.



Airco ½-In. Station Outlet Valve

Motor Car Cabs

A NEW line of motor car cabs has been announced by Fairbanks, Morse & Co., Chicago, for use on the various models of motor cars produced by this company. The new cabs are of sheet metal, with those for the larger section and bridge gang cars consisting of sheet steel while sheet aluminum alloy is used for the cabs of the light-weight motor cars.

The front and top of each cab are made in separate pieces, bolted together, with each unit stiffened and braced with angles and channels formed from sheet metal. In addition, sound-deadening material is used to reduce drumming. The cab windows consist of shatterproof glass set in rubber.

Those cabs intended for cars powered by motors equipped with steam condensers are fitted with a detachable hood back of the condenser to direct the flow of air downward. Furthermore, a feature of these cabs is a removable panel in the front sheet which permits converting the cab from one for cars without condensers into one for cars equipped with condensers. This changeover is said to require but a few minutes. In addition, this feature is said to provide for the use of the cab on various kinds of motor cars, as a panel may be readily made to suit conditions, since it is a flat sheet, with whatever openings are needed.

The New Cab Mounted on the Model 55D Light Section Motor Car

Side and rear curtains made of canvas are available for use with the cabs and are said to be designed so that they are held securely in place but may be quickly opened for quick unloading of the car in emergency.

De-Icing Agent

THE Chipman Chemical Company, Inc., Bound Brook, N. J., has introduced a new chemical compound, known as Kilfrost, which is designed to prevent ice from adhering to metal and other surfaces. Kilfrost products were formulated in England and used during the war to meet many new de-icing problems, and are said to be extensively used in that country by air lines and railroads wherever frost or ice causes trouble. Limited quantities are now available for experimental use in this country.

Kilfrost is supplied either as a grease or as a liquid suitable for spraying. Designed to prevent ice from forming on exposed surfaces, it is said to resist being washed off by rain or snow, to have lasting lubrication qualities, and to prevent corrosion. According to the manufacturer, Kilfrost should prove valu-

(For additional information on any of the products described on this page, use postcards, page 1023)

able in combatting ice around switch points, plates and rods, on signal rods, on third rails of electric lines, on outlets on the undersides of cars, and in similar locations.

New Lubricants

THE American Grease Stick Company, Muskegon, Mich., has introduced two special lubricants—American Dripless Oil and Door-Ease—for use in the railway field, including maintenance of way departments.

Dripless Oil is composed of a highly-refined, all-mineral base oil with a chemical inhibitor, suspended in a volatile carrier. The oil is said to enter as a rapid penetrant and to be converted into a full-bodied, long-wearing, rust-proofing film which does not drip or run at 200 deg. F., nor

Above—American Dripless Oil in the 4-Ounce Oiler. Right—The "Shop Stick" Size Door-Ease

gum or harden at 20 deg. F. below zero. Through high-speed penetration, this oil is said to reach its maximum flow immediately, making it possible to wipe off any surplus while the work is being done. Dripless Oil is available in refillable four-once oilers, in quart, gallon and five-gallon cans, and in 15-gal. drums.

It is recommended by the manufacturer for lubricating windshield wipers, wire rope cables of cranes and other lifting devices, signal equipment, door locks and checks, and for loosening rusty bolts and nuts in tracks and elsewhere.

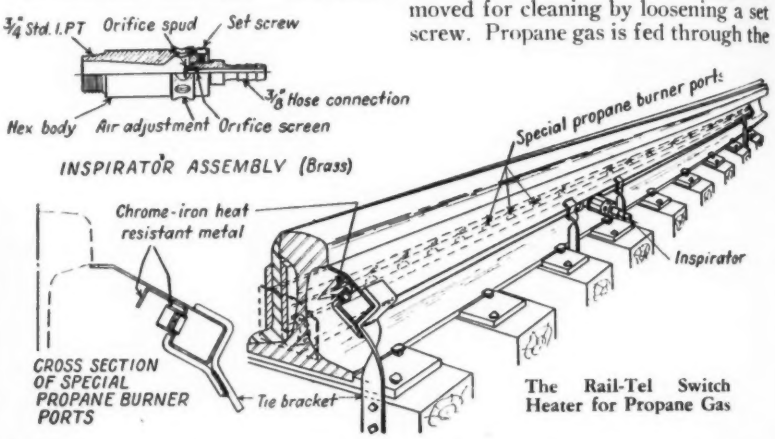
Door-Ease is a blended, solidified stainless stick lubricant, and is used like a crayon on exposed surfaces to stop squeaks and binding, and to prevent wear. When applied, the lubricant is said to change from a solid to an adhesive, tough-film plastic lubricant, for all weather conditions, which will not stain clothing or upholstery. The stick lubricant, "shop stick" size, comes in a push-bottom metal container 1 in. in diameter and 4½ in. in length.

Gas Switch Heaters

THE Rails Company, New Haven, Conn., has developed two new gas switch heaters, known as the "Rail-Tel" and the "Gas-Trac." The Rail-Tel heater is designed for use with propane gas as the fuel, while the Gas-Trac model operates on city gas. Both models feature a continuous flame against the switch, confined and directed by a metal baffle which is said to insure a full flame under traffic. Common to both types are attaching brackets that are bolted at their lower ends to the switch ties and welded at the top to form a forced-fit slip-joint connection to the heater proper, thereby eliminating any bolt or screw attachments to either the rail or between the heater and the bracket. Both types are available in six, eight, and ten-foot lengths; hence a combination of various lengths may be used to adapt the heaters to switches of practically any length.

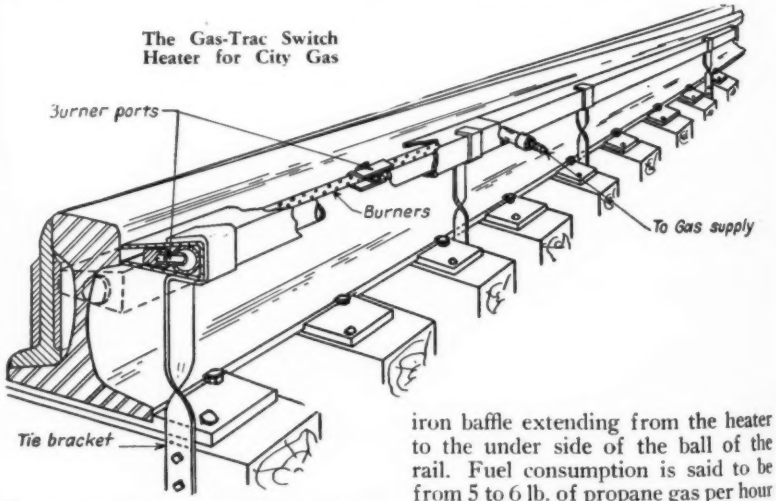
A distinctive feature of the Rail-Tel model is an inspirator, or mixing chamber, made of machined brass, located in the middle of each length. This inspirator is adjustable and is said to provide a wide range of air adjustment through hand control. It may be closed when not in use to prevent freezing. The inspirator also contains a built-in screen to catch pipe scales, which is said to be easily removed for cleaning by loosening a set screw. Propane gas is fed through the inspirator at 5-lb. pressure to burner ports spaced along the entire length of the burner to insure a continuous flame which is protected by a chrome iron baffle extending from the heater to the under side of the ball of the rail. Fuel consumption is said to be from 5 to 6 lb. of propane gas per hour per switch, based on four 10-ft. heaters. The gas may be supplied from a central point through underground pipe lines or, if desired, directly from a tank placed nearby at the track side.

Due to the low pressure under which city gas is supplied, the Gas-Trac model contains a pipe along its entire length to carry the gas to all ports of the heater. At these ports,



The Rail-Tel Switch Heater for Propane Gas

The Gas-Trac Switch Heater for City Gas



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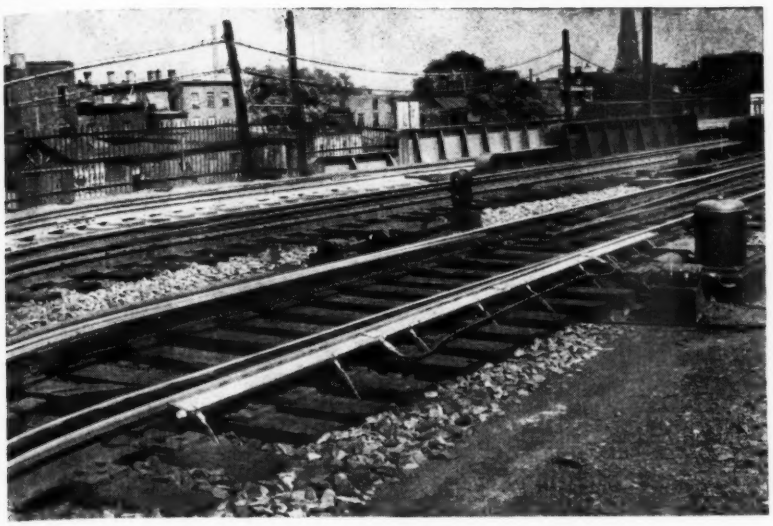


Installation View of the Rail-Tel Switch Heater

the gas, with sufficient air for efficient combustion, enters another pipe which has many small burners and provides a continuous flame along the length of the heater. The flame of the Gas-Trac heater is protected by a U-shaped baffle which fits against the head of the rail. City gas is supplied through pipe lines to a central connection located in the middle of each length from where it is distributed along the entire length of the heater. Fuel consumption of the Gas-Trac heater is said to vary from 600 to 800 cu. ft. per hr. per switch at a pressure of 3 to 4 oz., based on four 10-ft. heaters per switch.

Cribbing Machine

THE Kershaw Company, Inc., Montgomery, Ala., is now offering an auger-type, self-propelled, cribbing machine for ballast-stripping work in single-track territory. Known as the Kershaw Kribber, the machine is arranged for both on-track and off-track operation and is reported to be capable of operating at the rate of one-half crib every 30 sec. in cemented limestone ballast.

The machine comprises a walking beam, supported at each end on a penumatic-tired wheel, on which are mounted the power unit, the controls, the operator's seat and the travel mechanism. Placed transversely at the center of the walking beam is a frame carrying the stripping auger and its related mechanism. The transverse frame is supported at one end by the walking beam and at the other by a two-wheel carriage, or guide dolly, the purpose of which is to ride on the nearest rail of the track.

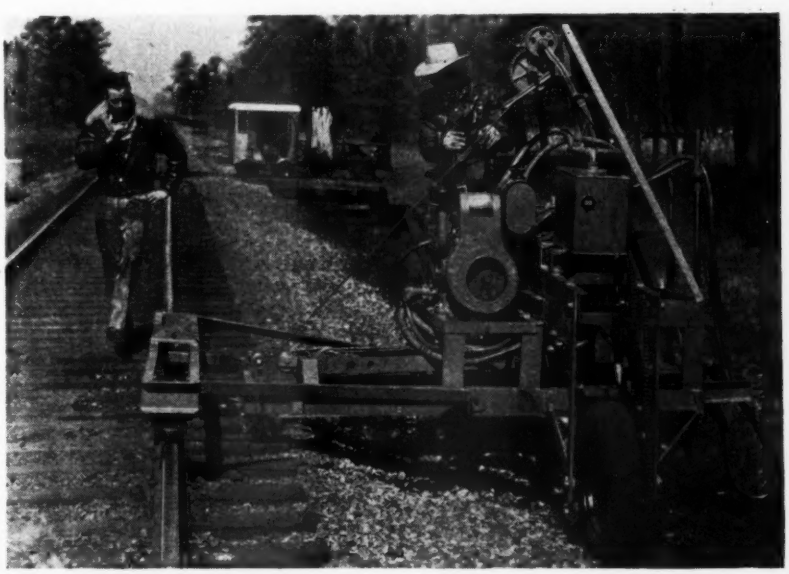
In operation as an on-track machine the unit moves with the pneumatic-tired wheels on the track shoulder, while the carriage at the end of the frame moves on the track rail. For off-track operation, the carriage is removed and the end of the frame is supported on a special rail, which is laid on the ties outside the rails and held in place by wedged clips attached to the base of the track rail.

The machine is powered by a 9-hp. Wisconsin gasoline engine which drives two hydraulic pumps. The pumps operate hydraulic motors which, in turn, operate the travel gear and the ballast-stripping mechanism. When properly spotted for stripping a crib, the auger—a specially-designed, 6-in. circular conveyor with a hardened, removable cutter head—is placed in operation and a crowding gear, or feed, is brought into use to cause it to penetrate the crib to the center line of the track. It is said that ballast may be removed to a level 4 in. below the bottom of the tie without disturbing the tie bed, resulting in a concave section between the ties. The arrangement of controls is such that the operator faces the work at all times and is afforded ample vision in each direction.

To clear for a train, the carriage frame is raised to an elevated position by means of a hand winch, an operation that may be performed, according to the manufacturer, in a minimum of 30 sec. When the train has passed, the frame is lowered and the work resumed. It is claimed that two of the units, with two operators and one helper, operated in tandem on opposite sides of the track, will strip the ballast from as much as 700 ft. of track per day.

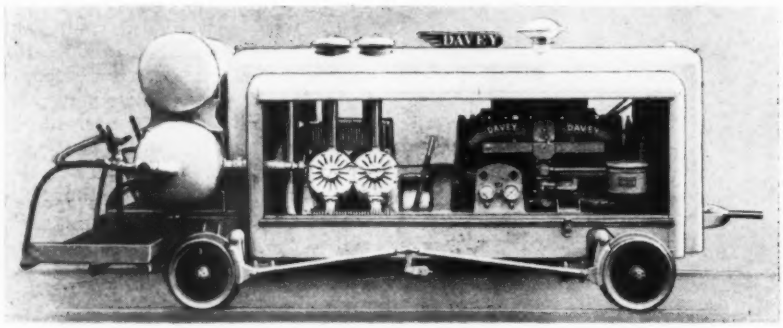
Air Compressor

THE Davey Compressor Company, Kent, Ohio, has announced a new line of "Air Chief" self-propelled, rail-car compressors for on-track operation. These units are available in 60, 105, 160, 210 and 315 c.f.m. capacities. Each compressor is mounted on flanged wheels equipped with railway-type brakes. The mounting has an operating platform large enough, it is said, to carry four persons. Motive power is furnished



One of the Kershaw Kribbers Working as an On-Track Unit

(For additional information on any of the products described on this page, use postcards, page 1023)

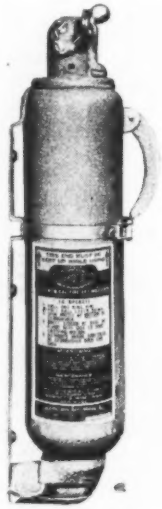


The Model 315 Davey Air Chief Rail-Car Compressor

by an air motor, equipped with a clutch, which provides for forward and reverse speeds from 4 to 10 m.p.h. In addition, transverse wheels are provided for easy removal from the track. Sufficient reverse power is available, according to the manufacturer, to provide for towing other equipment.

Fire Extinguisher

THE Fire Extinguisher Division of Ansul Chemical Company, Marinette, Wis., has announced a new four-pound dry-chemical fire extinguisher, known as the Ansul 4. The new extinguisher is 19⅛ in. long, 3½ in. in diameter and of lightweight material. As in other Ansul extingiushers, the new model uses Ansul Plus-Fifty dry chemical, which is said to be non-toxic, non-corrosive, non-abrasive and a non-conductor of electricity, and to be particularly suited for extinguishing fires in flammable liquids, gases, solids and electrical equipment as well as those involving ordinary combustibles.



The Ansul Model 4 Dry-Chemical Fire Extinguisher

It is said that the extinguisher is designed for effective use by inexperienced operators, that maintenance is greatly simplified, and that the extinguisher may be quickly recharged on the spot after use. A quick-opening bracket is supplied with the extinguisher for vertical or horizontal mounting in locations where space is limited. The extinguisher is said to be particularly adapted for use in shop buildings, trucks, mobile equipment and other similar locations for fire hazards that do not demand larger equipment.

Electric Hand Lamp

A NEW simple way to determine at a glance how much charge remains in a battery has been developed by the U-C Lite Manufacturing Company, Chicago, and incorporated in a portable rechargeable hand lamp, known as Model 311, which is said to throw a 2,500-ft. beam. In this lamp, the case, made of 18-gage welded steel, is fitted with a chrome-plated carrying handle equipped with "D" rings for a shoulder-carrying strap. The unit has a 6-in. lamp head and reflector, built-in switch and a charging receptacle.

The means for determining the charge remaining in the battery involves the use of three transparent windows in the case, one for each cell of a 6-volt, storage battery of 20-amp.-hr. capacity. In each of the windows are three specific-gravity ball indicators, one green, one white and one red. In a fully-charged battery the three balls are at the water level line. When the green ball is down the battery is said to be 5-per cent discharged, when the white ball is down it is 50-per cent discharged, and when the red ball is down the battery is 95-per cent discharged. With this arrangement it is said the user can tell instantly the condition of the battery without need of a hydrometer or guess work.

The Big Beam Model 311 Portable Rechargeable Electric Hand Lamp

The case is said to be 100 per cent spill-proof in any position. By means of the charging receptacle, the battery may be charged without dismantling. The shelf life of the battery is said to be 90 days under favorable conditions. Accessories available for the Model 311 lamp include: A hold-down bracket, a carrying strap, a resistance switch, snap-on lens (red, green, blue and floodlight), and a battery charger with 15-ft. extension cord, complete with 6-volt, 25-watt bulb adapter.

Welding Electrode

THE Electric Welding division of General Electric Company, Schenectady, N.Y., has announced the development of a new electrode for use in hard-surfacing applications where resistance to impact, wear and abrasion is required. Designated as Type W-94, the new electrode will operate on alternating current or direct-current reverse polarity. It is reported that deposits from the new electrode will work-harden to over 50 Rockwell C. This electrode is available in 14-in. lengths with diameters of ⅛ in., 3/16 in., ¼ in. and 5/32 in.

Aluminum Roofing

THE Aluminum Company of America, Pittsburgh, Pa., has announced production of a new aluminum-alloy corrugated roofing, called Alcoa Industrial Roofing, together with a matching aluminum siding and necessary fittings, such as ridge roll, flashing, rivets, nails and other fastenings.

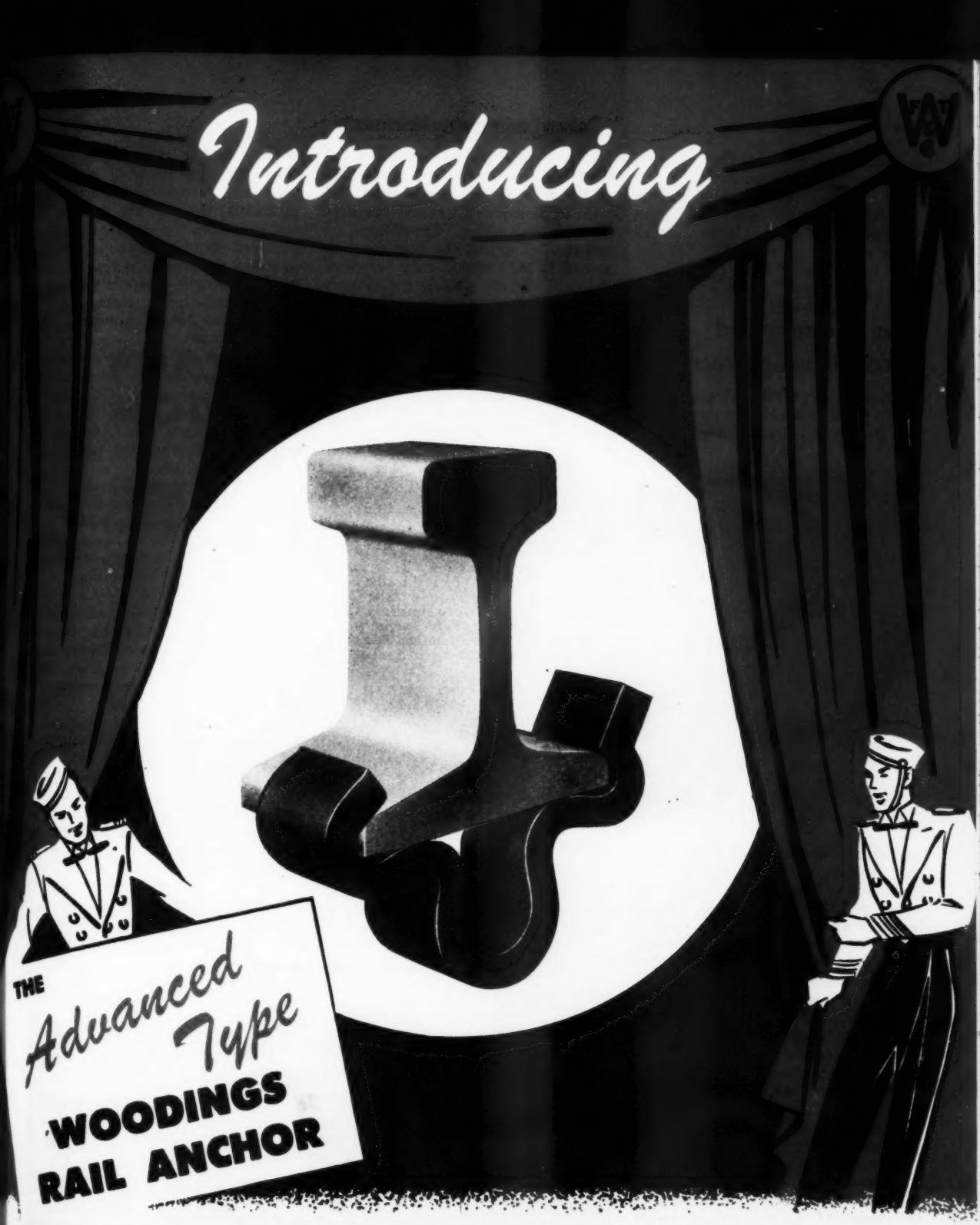
Made from a special aluminum alloy, the new material is offered as a running mate for the standard Alcoa Roofing Sheet and is available in sections from 5 ft. to 12 ft. long and 32 in. wide after allowing for a side lap of 1½ corrugations. The roofing has a thickness of .032 in. and is said to be capable of supporting uniformly distributed loads ranging from 30 lb. per sq. ft. on purlins spaced 6 ft. 5 in. apart, to 105 lb. per sq. ft. on purlins spaced on 3-ft. 6-in. centers.

The features of the new roofing are said to be strength combined with light weight, high resistance to weathering, minimum maintenance and reduced roof load. These features, it is said, make the new roofing par-

(Continued on page 1008)

(For additional information on any of the products described on this page, use postcards, page 1023)

Introducing



THE *Advanced Type*

WOODINGS RAIL ANCHOR

WOODINGS FORGE & TOOL CO.

VERONA, PA. CHICAGO, ILL.

ticularly adapted for warehouses, roadway buildings and similar structures. Because of its light weight, it is pointed out that the material can be placed or installed with a small force of men.

Pipe Cleaning and Reconditioning Process

THE Pittsburgh Pipe Cleaner Company, Pittsburgh, Pa., is introducing into the United States the Eric electrolytic pipe-cleaning and reconditioning process, developed by the Eric Engineering Company of England, in which pipe lines are cleaned in place and then are reconditioned by electroplating the interior with bitumen to prevent the formation of tubercles or other incrustations on the inside surfaces of the pipe.

In this process, a suitable length of the line, up to approximately 1,000 ft., is disconnected from the remainder and is thoroughly cleaned with the aid of cutters, scrapers, brushes and rubber pistons, after which rubber squeegees are used to clean out corrosion pits and other irregularities.

When the pipe is thoroughly clean, a cylindrical copper cathode, about a foot long, is centered in the pipe by means of guides and is drawn through it to the extreme end of the section to be treated. Attached to the cathode is a small wire rope which is used to draw the cathode back through the pipe as the work of electroplating progresses. The cathode is electrically insulated from the pipe wall but is connected to the negative pole of a portable electric generator. The positive pole of the generator is bonded to the pipe wall by means of a temporary weld.

When these preparations are complete, fittings are attached to the ends of the isolated section and it is filled with an emulsion of specially-prepared bitumen and water. The fittings are constructed so that the wire rope, attached to the cathode, may be pulled through, thereby pulling the cathode back through the pipe.

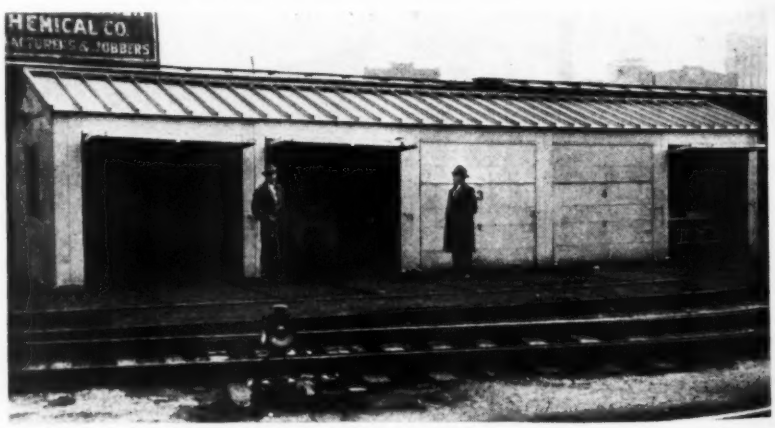
The portable generator is then placed in operation and the current developed—approximately 125 volts—flows through the pipe wall to a point opposite the cathode and then through the bitumen solution to the cathode, returning to the generator. This charges the bitumen particles negatively and causes them to be attracted to the positively-charged wall of the pipe. On reaching the pipe wall they adhere to it and, in approximately a minute's time, a layer of asphalt about 1/64 in. thick forms on the pipe. The deposition of a sufficient amount of bitumen is indicated by a substantial drop in the flow of current and, when this occurs, the cathode is moved about a foot to a new position, and the process is repeated until the entire length of pipe has been coated. If desired, the cathode can be moved slowly and continuously during the process.

The cathode is then withdrawn from the pipe and the electrical connections are removed. The bitumen compound is then pumped into a container for future use. After a few minutes of flushing, the pipe is said to be ready for use.

This process has been in use in England for more than ten years and the results are reported as highly satisfactory. At Liverpool, some 800,000 ft. of pipe in the public water-supply system has been reconditioned by the process. After ten years, a 4-in. pipe was removed for examination and it was found that the bitumen layer was still hard and adhering firmly to the pipe wall to such an extent that it could not be removed readily with a knife.

In general, the maximum length of pipe which can be coated by this process at one time is limited to approximately 1,000 ft., but this can be increased under more favorable conditions. When necessary, the work can be arranged in such a manner that water can be supplied to the consumer during periods of peak demand. However, the usual practice is to shut off the water at the start of the day's operations and to restore the supply in the afternoon.

Section of a Pipe, Treated by the Eric Process, After Approximately 10 Years Service in a Municipal Water Service System in England



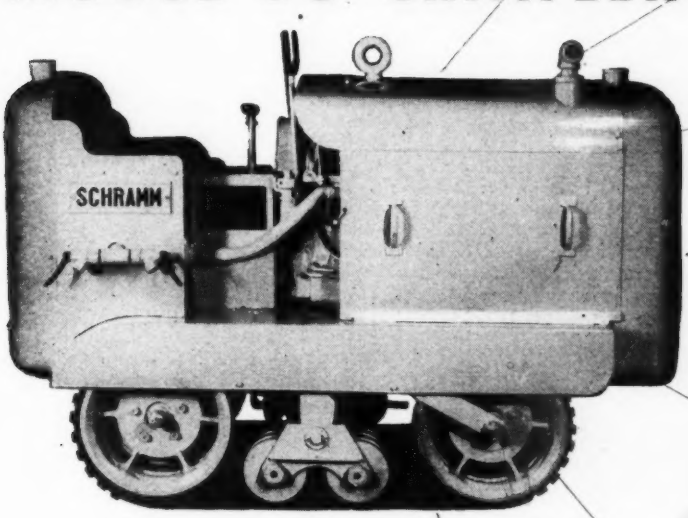
All-Steel Prefabricated Motor-Car Building

FOR housing track motor cars at Chattanooga, Tenn., the Nashville, Chattanooga & St. Louis has provided this five-stall structure—a standard Armco Steelox building. It is of all-steel construction and consists of prefabricated side and roof panels with standard windows and "up-folding" doors. Buildings of this type can be erected in a relatively short time and, when necessary, may be dismantled and reassembled at another location.

(For additional information on any of the products described on this page, use postcards, page 1023)

So many uses

FOR THIS SCHRAMM MODEL 60 CRAWLER



Tie Tamping

Driving Sheet Pile

Concrete Breaking

Rock Drilling

Timber Sawing

Earth Spading

Spray Painting

. . . a hard hitting off-track compressor that goes anywhere

Air is versatile, perfect for tie tamping and many other railroad jobs. And when you have a handy off-track compressor that operates four tools and goes anywhere under its own power—like the Schramm Model 60 Crawler—you will find new work-speeding uses for it all the time. Like every Schramm, the Model 60 Crawler is old Dependability itself. It's simple and compact, the kind of machine men like to operate. You will like its arrangement of both motor and compressor units in a Ford-Mercury V-8 block; learn about this and other details before you buy any compressor. Address Schramm's Railway Sales Division for your copy of the complete Schramm catalog.

SCHRAMM INC.

THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA

Changes in Railway Personnel

General

G. A. Kellow, assistant engineer on the Chicago, Milwaukee, St. Paul & Pacific, at Chicago, has been appointed a member of the president's committee, with the same headquarters.

C. E. Crippen, chairman of the president's committee of the Chicago, Milwaukee, St. Paul & Pacific, at Chicago, and an engineer by training and experience, has been appointed superintendent of the Twin City terminals, with headquarters at Minneapolis, Minn.

Harland H. Best, an engineer by training and experience, has been appointed general superintendent of the Toledo, Peoria & Western, with headquarters at East Peoria, Ill. He served as general manager of the road during the period of federal operation.

Engineering

T. C. Kauffman has been appointed assistant division engineer of the New York Central, with headquarters at Toledo, Ohio.

A. J. Robinson, inspector on the Great Northern, has been appointed engineer, timber preservation, at Spokane, Wash.

Walter Bohnstengel, engineer of tests on the Atchison, Topeka & Santa Fe, at Topeka, Kans., has retired.

R. W. Willis, assistant chief engineer of the Chicago, Burlington & Quincy, at Chicago, has retired. **C. J. McCarty,** division engineer, at Aurora, Ill., has retired.

R. S. Radspinner, draftsman in the general office of the Chesapeake & Ohio, has been appointed assistant cost engineer, with headquarters at Barboursville, W. Va.

J. S. Findley, division engineer on the Chicago, Burlington & Quincy, at Denver, Colo., has been appointed locating and construction engineer, with the same headquarters.

A. C. Kelley, formerly assistant engineer on the Nashville, Chattanooga & St. Louis, at Nashville, Tenn., has resigned to practice as consulting engineer, with offices at 1003 Cotton States building, Nashville.

George S. Crites, whose resignation as division engineer on the Baltimore & Ohio, at Baltimore, Md., was reported in the September issue, was born at Bakersfield, Cal., on January 6, 1881, and received his higher education at the University of California. He entered railroad service in 1899 as a trackman and clerk on the an Joaquin division of the Southern Pacific, and served until 1907 as section foreman, extra gang foreman, draftsman, and assistant engineer, at various points. From August 1, 1907, to December 18, 1908, he served as engineer maintenance of way on the Southern Pacific of Mexico, and returned to the S.P. on December 19, 1908, and served successively as assistant engineer and assistant district engineer, Southern district. On November 1, 1911, Mr. Crites became division engineer at Los Angeles, Cal., and one year later he was appointed assistant engineer on the Tucson division. Mr. Crites entered the service of the B. & O. on May 1, 1916, as a draftsman, at Cincinnati, Ohio, became district bridge inspector on July 1 of the same year, and was appointed assistant division engineer at Flora, Ill., on March 16, 1917. On July 16, 1917, he was named assistant engineer at Baltimore, and one year later he was advanced to division engineer on the Baltimore division. On June 1, 1933, he was transferred to the Buffalo division, with headquarters at Punxsutawney, Pa., and on January 1, 1943, he returned to Baltimore, where he served until his recent resignation to enter private practice.

Lawrence Spalding, whose appointment as principal assistant engineer of the Bessemer & Lake Erie at Greenville, Pa., was announced in the September issue,

Lawrence Spalding

was born on July 25, 1890, at Yonkers, N. Y. Mr. Spalding was graduated from Cornell University, College of Civil Engineering, in 1913, and entered railroad service in June of that year as draftsman of the Pittsburg, Shawmut & Northern, serving in this capacity until February, 1914, when he went with the Bessemer & Lake Erie as a draftsman. He was appointed supervisor of structures in March, 1916, became assistant valuation engineer in November, 1919, and in April, 1924, was promoted to valuation engineer, at which post he remained until his recent advancement.

E. N. Philips, assistant valuation engineer of the Union, has been promoted to valuation engineer, with headquarters as before at Pittsburgh, Pa.

R. F. McCarvel, assistant engineer on the Butte, Anaconda & Pacific, at Anaconda, Mont., has been appointed maintenance of way engineer. This change followed the death on August 16 of **P. R. Peery,** chief engineer, which is reported elsewhere in these columns.

Albert M. Traugott, whose retirement as chief engineer of the Virginian at Norfolk, Va., was reported in the September issue, was born at Rochester, N. Y., on July 31, 1882, received his higher education at Purdue University, and entered railway service in 1898 as chainman with

Albert M. Traugott

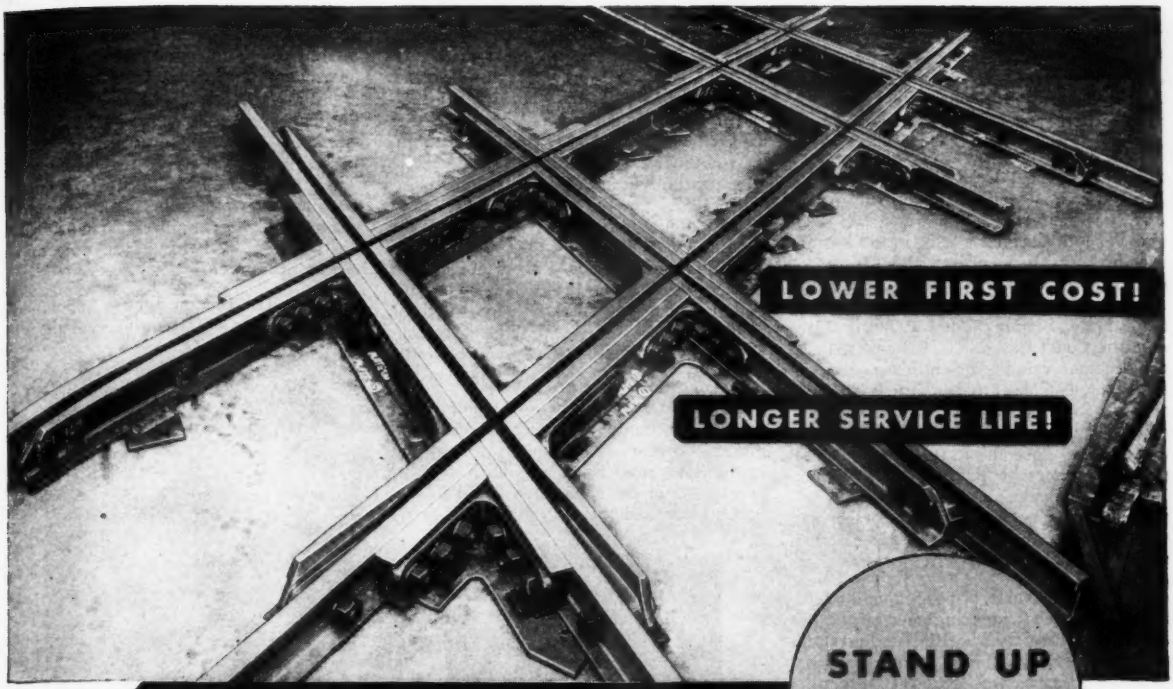
the Buffalo, Rochester & Pittsburgh (now part of the Baltimore & Ohio), later serving in the same capacity on the Delaware, Lackawanna & Western. In 1903 he went with the Deepwater Railway (now Virginian) as rodman, and a year later became a draftsman on the same road. In 1908 he began his career with the Virginian as resident engineer, subsequently serving as locating engineer, 1913-1914, and as division engineer, 1914-1918. He was appointed acting chief engineer in 1919, becoming assistant chief engineer in 1920. In 1927 Mr. Traugott was advanced to chief engineer, the position he held at the time of his retirement.

A. B. Chaney, district engineer on the Missouri Pacific, at Little Rock, Ark., has been appointed assistant engineer maintenance of way, with headquarters at St. Louis, Mo., succeeding **W. H. Vance,** who has retired after more than 45 years of railroad service. **H. D. Knecht** has been appointed district engineer, at Little Rock, succeeding Mr. Chaney.

C. W. Layne, has been appointed assistant cost engineer on the Piedmont and Rivanna subdivisions of the Chesapeake & Ohio, at Richmond, Va., succeeding **S. V. Flanagan,** who has been transferred to the Peninsula subdivision and Newport News-Norfolk Terminal division, where he succeeds **J. O. Sales,** whose appointment as assistant supervisor of track was reported in the September issue.

N. L. Fleckenstine, assistant division engineer on the Maryland division of the Pennsylvania, has been promoted to division engineer on the Grand Rapids division, to succeed **W. W. Portser,** who has retired. **Malcolm Young,** supervisor of track on the Philadelphia division, at

(*Continued on page* 1012)



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Comprises 154 pages of helpful data, replete with photos, drawings and specifications, covers every track work need. A request on your letterhead will bring your copy promptly.

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Successors to

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(*Continued from page* 1010)

Lancaster, Pa., has been promoted to assistant division engineer on the Maryland division, with headquarters at Baltimore, Md., to succeed Mr. Fleckenstine.

James Bell Wilson, whose appointment as chief engineer of the Georgia at Atlanta, Ga., was reported in the July issue, was born at Atlanta on June 16, 1905. Mr. Wilson received a B.S. in civil engineering from the Georgia School of Technology in 1926 and entered railroad service on June 21, 1926, as draftsman with the Atlanta, Birmingham & Atlantic (now Atlantic Coast Line). In November, 1926, he became valuation engineer, and in February, 1927, he was appointed assistant engineer of the successor road, the Atlanta, Birmingham & Coast (now Atlantic Coast Line), becoming its principal assistant engineer on February 1, 1939. On October 22, 1945, Mr. Wilson was appointed division engineer of the Georgia, which position he held at the time of his recent appointment as chief engineer.

W. B. Mackenzie, whose appointment as maintenance bridge engineer on the St. Louis-San Francisco, with headquarters at Springfield, Mo., was reported in the September issue, was born at Moncton, N.B., on June 30, 1900, and received his higher education at Acadia University and at McGill University. He entered railroad service on June 15, 1922, as a carpenter in the valuation department of the Frisco, at St. Louis, Mo., and in 1923 he became an instrumentman, field

W. B. Mackenzie

location party, at Dixon, Mo. From 1923 to 1933 Mr. Mackenzie served as a bridge draftsman at St. Louis. In the latter year he was promoted to assistant engineer, steel bridge department, at Springfield, and one year later he was advanced to assistant bridge engineer, with the same headquarters, the position he held at the time of his recent promotion.

W. Reed Peck, whose appointment as principal assistant engineer of the Georgia, at Atlanta, Ga., was reported in the July issue, was born at Sherburn, Ky., on January 2, 1905, and was graduated in civil engineering from the University of Kentucky in 1926. After three months as a civil engineer with the State Highway Department of Kentucky, Mr. Peck entered railroad service in September, 1926, as assistant engineer of the Atlanta & West Point and the Georgia, serving in that capacity until May, 1934, when he went with the Illinois Central. In October of that year he became highway engineer, State Highway Department of Georgia, where he remained until January, 1937. On the latter date Mr. Peck was appointed division engineer of the Atlanta & West Point, the Western of Alabama, and the Georgia, serving in that capacity until June, 1944, when he became engineer maintenance of way of these roads. He was serving in the latter capacity of the time of his recent appointment as principal assistant engineer.

Howard G. Adams, whose appointment as assistant chief engineer of the Virginian, at Norfolk, Va., was announced in the September issue, was born at Ashtabula, Ohio, on November 2, 1886. Mr. Adams received the degree in civil engi-

Howard G. Adams

neering from Purdue University in 1908 and entered the service of the Virginian in that year. With the road continuously since that time, except for a short period during 1918-1919 when he was employed by the New York Central, Mr. Adams held varied engineering posts. He was appointed valuation engineer in 1943, the position he held at the time of his recent promotion.

E. A. Humphreys, assistant division engineer on the Cleveland, Cincinnati, Chicago & St. Louis (part of the New York Central System), at Springfield, Ohio, has been appointed division engineer of the Illinois division, with headquarters at Mattoon, Ill., succeeding **C. V. Talley,** who has been transferred to the Ohio division, with headquarters at Springfield.

Mr. Humphreys was born in Hickman County, Ky., on June 1, 1885, and was graduated by the University of Kentucky in 1913 with the degree B.C.E. He entered the service of the Cleveland, Cincinnati, Chicago & St. Louis in 1913, and served until 1917 as rodman, instrumentman, and assistant engineer at Wabash, Ind., Indianapolis, and Hillsboro, Ill. In 1917 he became supervisor of track at Harrisburg, Ill., and in 1918, resident engineer, construction, at Fowler, Ind., and Galion, Ohio. Mr. Humphreys was appointed assistant engineer, general office, at Cincinnati, Ohio, in 1920. In the following year he was named resident engineer, construction, at Union City, Ohio, and Sidney, and served in that capacity until 1926, when he was appointed district engineer, construction, at Cincinnati. From 1932 to 1939 he served as office engineer, general offices, at Cincinnati. During the latter year he was appointed assistant division engineer, at Springfield, the position he held at the time of his recent promotion.

Joseph D. Hudson, whose appointment as assistant to chief engineer of the Virginian, at Norfolk, Va., was announced in the September issue, was born in Van Alstyne, Tex., on December 15, 1888, and received a bachelor's degree in civil engineering from Mississippi State College in 1915. He entered the service of the Virginian in March, 1918, and except for a short time during World War I, when he served in the United States Army, has been in the continuous service of the Virginian in various capacities, including instrumentman, draftsman, and division engineer at Victoria, Va., and as assistant engineer, the position he held at the time of his recent promotion.

Joseph D. Hudson

Track

A. S. Lyons, roadmaster on the Canadian National, at Port Arthur, Ont., has retired.

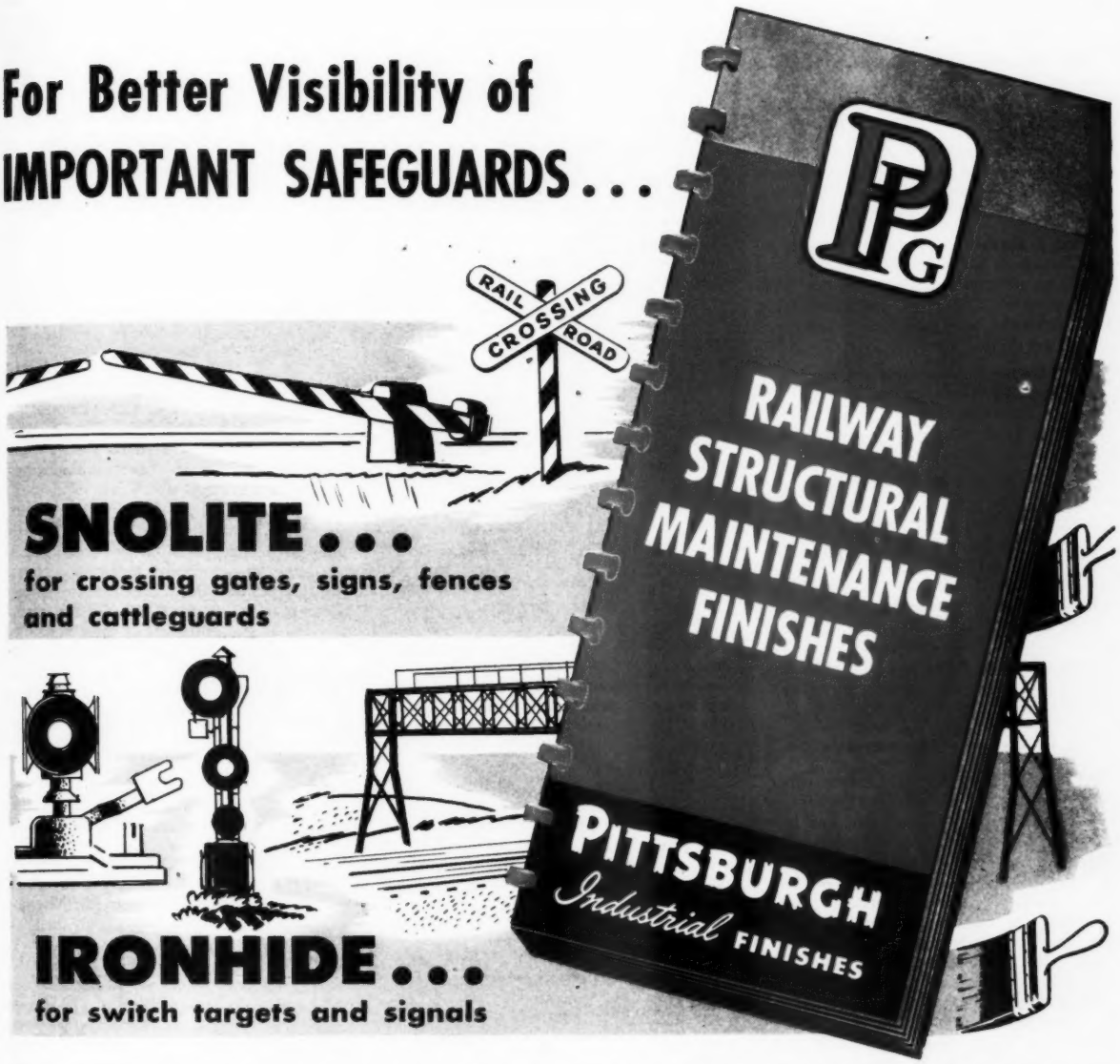
M. E. Noel, roadmaster on the Chicago, Milwaukee, St. Paul & Pacific, at Horicon, Wis., has retired.

H. M. Overpeck, supervisor of track on the Elgin, Joliet & Eastern, at South Chicago, Ill., has been appointed roadmaster of the Joliet division, with headquarters at Joliet, Ill., succeeding **Charles Pfeifer,** who has retired after nearly 50 years of service.

R. E. Meyer has been appointed roadmaster of subdivision No. 2 of the Chicago & North Western, at Chadron, Neb., which was previously under the jurisdiction of **W. F. Coryell,** who has retired. **W. D. Reed** has been appointed roadmaster at Valentine, Neb., replacing Mr. Meyer.

(*Continued on page* 1014)

For Better Visibility of IMPORTANT SAFEGUARDS...



SNOLITE...

for crossing gates, signs, fences and cattleguards

IRONHIDE...

for switch targets and signals

TO increase the safety of railroad operation, all types of signals and signs must be kept painted to high standards of visibility. Pittsburgh provides special finishes designed particularly for this purpose.

Pittsburgh's SNOLITE is used on crossing gates, signs, fences and cattleguards. It comes ready-mixed or in semi-paste consistency. Both types can be brushed on or sprayed.

Its semi-paste form can be easily and economically reduced. When thinned it has fully one-half greater opacity than ordinary paints and gives one-third greater spread.

Snolite dries to a smooth surface of superior whiteness which eventually chalks instead of checking or cracking. Even after chalking, it continues to obscure the surface, retaining uniform color. Ordinary industrial gases will not affect or discolor it.

Pittsburgh also provides IRONHIDE Signal Enamels manufactured from color-fast pigments and containing synthetic resin vehicles which impart and maintain high gloss and color.

Other Pittsburgh Industrial Finishes available for maintenance of fixed properties include STATIONHIDE for interiors and exteriors of buildings; IRONHIDE, a tough elastic finish for the protection of steel structures; CEMENTHIDE for interiors and exteriors of buildings; traffic and zone marking paints; and a series of Color Dynamics finishes for use in shops and on machinery.

Write today for Pittsburgh's new booklet which lists its complete line of Railway Structural Maintenance Finishes. Included are many practical suggestions for their most efficient and economical use.

PITTSBURGH PLATE GLASS COMPANY
Industrial Paint Division, Pittsburgh, Pa.
Factories: Milwaukee, Wis.; Newark, N. J.; Springdale, Pa.; Houston, Texas; Los Angeles, Cal.; Portland, Ore. Ditzler Color Division, Detroit, Mich. The Thresher Paint & Varnish Co., Dayton, O. Forbes Finishes Div., Cleveland, O.

PITTSBURGH PAINTS

PITTSBURGH PLATE GLASS COMPANY, PITTSBURGH, PA.

PITTSBURGH STANDS FOR QUALITY PAINT AND GLASS

(*Continued from page* 1012)

John Shannon has been appointed track supervisor on the Butte, Anaconda & Pacific, with headquarters at Anaconda, Mont.

J. E. Stennett has been appointed assistant supervisor of track on the Rivanna subdivision of the Chesapeake & Ohio, with headquarters at Richmond, Va.

Fred J. Haase, assistant roadmaster on the Chicago & North Western, at Chicago, has been promoted to roadmaster, with headquarters at Norfolk, Neb., replacing **L. J. Schwabe,** who has been transferred to Antigo, Wis.

F. E. Dauner, roadmaster on the Atchison, Topeka & Santa Fe, at Slaton, Tex., has been transferred to Wellington, Kan., replacing **J. A. Toliver,** who has been transferred to Slaton.

R. P. Scott has been appointed roadmaster on the Chicago, Rock Island & Pacific, with headquarters at El Reno, Okla., succeeding **G. W. Runnels,** who has been transferred to other duties at his own request. **D. C. Close** has been appointed acting roadmaster, with headquarters at Enid, Okla., replacing **J. S. Walpole,** who has been granted a leave of absence. **Rex Price** has been appointed acting assistant roadmaster, with headquarters at El Reno.

Changes on the Pennsylvania

W. M. McCracken, branch line supervisor of track on the Renovo division of the Pennsylvania, at Erie, Pa., has been transferred to main line supervisor on the Pittsburgh division, with headquarters at Trafford, Pa., succeeding **G. W. Peoples,** resigned. **Russell Pitts,** assistant supervisor of track on the Eastern division, has been promoted to supervisor of track, with headquarters at Erie, to succeed Mr. McCracken, and **T. A. Mainquist,** assistant supervisor of track on the Maryland division, at York, Pa., has been transferred to the Eastern division, succeeding Mr. Pitts. **C. W. Owen,** assistant on the engineer corps, at Toledo, Ohio, has been promoted to assistant supervisor of track at York, succeeding Mr. Mainquist.

J. W. McGinnis, assistant supervisor of track on the Panhandle division of the Pennsylvania, at Steubenville, Ohio, has been promoted to supervisor of track on the Erie & Ashtabula division, with headquarters at Niles, Ohio, to succeed **A. M. Schofield,** who has been transferred to the Philadelphia division, at Lancaster, Pa., where he succeeds **Malcolm Young,** whose promotion to assistant division engineer is reported elsewhere in these columns. **J. M. Rankin,** assistant supervisor of track on the Williamsport division, at Northumberland, Pa., has been transferred to Steubenville, succeeding Mr. McGinnis, and **R. L. McMurtrie,** assistant on the engineer corps, at Altoona, Pa., has been promoted to assistant branch-line supervisor of track at Northumberland on the Williamsport division, succeeding Mr. Rankin.

E. E. Zacharias, supervisor of track at Greenville, Ill., on the St. Louis division of the Pennsylvania, has been transferred to the Eastern division, at Rochester, Pa., succeeding **A. D. Kerr,** resigned. **W. R. Dunn,** supervisor of track on special duty in the office of the comptroller, at Philadelphia, Pa., has been assigned to the St. Louis division, at Greenville. **R. D. Jordan, Jr.,** supervisor of track on the Cleveland division at Orrville, Ohio, has been appointed supervisor of track, special duty, in the office of the comptroller, at Philadelphia. **Scott C. Lyons,** assistant supervisor of track on the Maryland division, succeeds Mr. Jordan as supervisor of track on the Cleveland division at Orrville. **M. K. Clark,** assistant supervisor of track on the Conemaugh division, at Aspinwall, Pa., replaces Mr. Lyons on the Maryland division. **D. D. Rake,** assistant on the engineering corps, Central region, succeeds Mr. Clark as assistant supervisor of track on the Conemaugh division, at Aspinwall. **F. T. Lyons,** general foreman on the Panhandle division, becomes assistant supervisor of track on the Cleveland division, at Cleveland, Ohio, where he replaces **C. R. Burke,** who resigned recently.

Water Service

Paul Griffy, water works repairman on the Illinois Central, at Jackson, Tenn., has been appointed supervisor of water service, with headquarters at Clinton, Ill., where he succeeds **J. M. Davis,** who has retired.

Bridge and Building

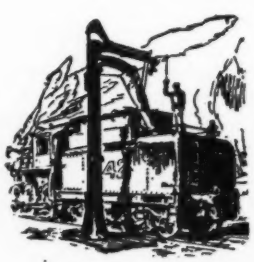
D. N. Mitchell has been appointed assistant supervisor of bridges and buildings on the Chesapeake & Ohio, with headquarters at Newport News, Va.

R. L. Lewis has been appointed bridge and building supervisor on the Butte, Anaconda & Pacific, with headquarters at Anaconda, Mont.

H. S. Hildebrand, general foreman, bridges and buildings, on the Indianapolis division of the Pennsylvania, has been appointed acting assistant master carpenter on the Fort Wayne division, at Fort Wayne, Ind.

Fred Dodson has been appointed assistant supervisor of bridges and buildings on the Clifton Forge division of the Chesapeake & Ohio, with headquarters at Clifton Forge, Va., succeeding E. B. Jones, promoted.

James Sheil, assistant general foreman of bridges and buildings on the Scranton division of the Delaware, Lackawanna & Western, has been promoted to general foreman of bridges and buildings on that division, to succeed **Alexander B. MacQueen** who has retired.



Special

In connection with the recent creation of a separate work-equipment department on the Chesapeake & Ohio, the following appointments have been made. **R. K. Johnson,** supervisor of reclamation at Barboursville, W. Va., has been appointed supervisor of work equipment and reclamation; **W. H. Sims,** signal inspector, has been appointed supervisor of reclamation; **N. W. Hutchison,** assigned to special duties under the engineer maintenance of way and chief engineer at Richmond, Va., has been appointed engineer of work equipment; **W. H. Harrison,** assistant cost engineer, Richmond, has been appointed assistant engineer of work equipment; **H. D. Bowen,** general foreman, reclamation plant, at Barboursville, has been appointed supervisor of work equipment; **W. S. Aylor,** machinist foreman, reclamation plant, has been appointed inspector of work equipment; **R. W. Patton,** signal maintenance foreman, has been appointed inspector of work equipment; and **L. W. Ross,** chief clerk, reclamation plant, has been appointed assistant to superintendent of work equipment and reclamation.

Obituary

Jack R. Akin, right of way engineer on the Denver & Rio Grande Western, died at Denver, Colo., on July 17.

George Watson Kitterdge, who retired in 1926 as chief engineer of the New York Central at New York, died on August 22 at his home in Yonkers, N. Y. Mr. Kitterdge was born on December 11, 1856, at North Andover, Mass., and received his higher education at the Massachusetts Institute of Technology, from which he was graduated in 1877. He entered railroad service in 1880 with the Pittsburgh, Cincinnati & St. Louis (P.R.R.), subsequently becoming chief engineer of the Gleveland, Cincinnati, Chicago & St. Louis. Mr. Kittredge served as chief engineer of the New York Central from April, 1906, until December, 1926.

Paul Rising Peery, chief engineer of the Butte, Anaconda & Pacific at Anaconda, Mont., died at the Murray hospital in Butte, Mont., on August 16, following an illness of two weeks. Mr. Peery was born on October 12, 1892, and was graduated from the University of Colorado, where he studied civil engineering. He joined the engineering department of the Union Pacific in 1913, and remained with that road until April, 1938, when he became associated with the B. A. & P. He subsequently held positions successively as maintenance of way engineer and superintendent of maintenance of way and structures, and on January 1, 1945, was promoted to chief engineer, and was holding this position at the time of his death recently.

(*Please turn to page* 1016)

MONOTUBES bring foundation costs down to earth!

● If you're looking for ways to cut foundation costs—specify *Monotubes.* Cost-conscious engineers and builders have proved on job after job that the exclusive advantages of Monotubes reduce costs . . . save time. Here are 5 reasons why:

The fluted, tapered design speeds driving.
They're easily extendible to any required length, *right on the job.*
Thorough inspection is quick and easy before concreting.
Light in weight, they are easily and quickly handled.
Their sturdy construction eliminates use of driving mandrell.

Check over every time-saving, money-saving feature. You'll see how Monotubes bring foundation costs "down to earth". Available in gauge, size, and taper to meet varying soil conditions. Send for complete information. Your inquiry will be answered promptly. Write The Union Metal Manufacturing Company, Canton 5, Ohio.

UNION METAL

Monotube Foundation Piles

BEALL Hi-Duty SPRING WASHERS
are made especially to stand the strain of the heavy-duty rail service required by today's high-speed freight and passenger trains.

These washers are strong and tough, yet provide the necessary "springing action" required at rail joints, frogs and crossings.

We control every step of their manufacture — from the specification of the specially-developed formula and process used in making the steel to the forming, hardening, tempering and testing operations.

BEALL TOOL DIVISION of *Hubbard* & Co.
EAST ALTON, ILL.
Specialist Manufacturers of Spring Washers

BEALL Hi-Duty
SPRING WASHERS
MADE ESPECIALLY FOR RAILROAD SERVICE

Association News

Maintenance of Way Club in Chicago

The first meeting of the season will be held on October 27 at Hardings at The Fair. The program will consist of two motion pictures, both treating the subject of safety from a realistic viewpoint. One of the pictures, entitled "Use Your Head," will be presented through the courtesy of the Denver & Rio Grande Western, while the other, entitled "Maintenance of Way Mishaps" will be shown during this meeting through the courtesy of the Southern Pacific.

Railway Tie Association

This association held its twenty-ninth annual convention on September 23-25 at the Arlington Hotel, Hot Springs, Ark. The program of the meeting was comprised of a large number of committee reports and addresses, many of which were of direct interest to railway men. Addresses presented during the meeting included one by C. Miles Burpee, vice-president, Simmons-Boardman Publishing Corporation, New York, on the "Needs of the Railroads for Crossties in the Next 12 Months"; one by C. E. Johnston, chairman, Western Association of Railway Executives, Chicago, on "The Railroads' Economic Outlook For the Next 12 Months"; and one by Paul J. Neff, chief executive officer, Missouri Pacific Lines, which was presented at a luncheon meeting that was held on Wednesday, September 24.

Other addresses delivered before the meeting included one on the "Trend of Production of Crossties" by T. J. Turley, Jr., Bond Brothers Company, Louisville, Ky.; on "What the Railroad Foresters Are Doing," by James Spiers, forester,

(*Continued on page* 1018)

Meetings and Conventions

American Railway Bridge and Building Association—Annual meeting, September 21-23, 1948, Hotel Stevens, Chicago.

American Railway Engineering Association—Annual Meeting, March 16-18, 1948, Chicago.

American Wood-Preservers' Association—Annual meeting, April 27-29, 1948, St. Paul, Minn.

Bridge and Building Supply Men's Association—Joint exhibit with Track Supply Association, September 21-23, 1948, Hotel Stevens, Chicago, during concurrent conventions of American Railway Bridge and Building Association and Roadmasters' Association.

Maintenance of Way Club of Chicago—Next meeting, October 27, 1947.

National Railway Appliances Association—Thirty-third annual exhibit, Chicago, March 15-18, 1948, in connection with A.R.E.A. convention.

Roadmasters' and Maintenance of Way Association of America—Annual meeting, September 21-23, 1948, Hotel Stevens, Chicago.

Track Supply Association—Joint exhibit with Bridge and Building Supply Men's Association, September 21-23, 1948, Hotel Stevens, Chicago, during concurrent conventions of Roadmasters' Association and American Railway Bridge and Building Association.

SO EASY!

Tough Grinding is Simplified

with

Thor

PNEUMATIC GRINDERS

With speed and power to spare, Thor Pneumatic Grinders take the "grind" out of heavy snagging and general grinding. Thor's "air behind the blades" design assures instant starting and steady power. Thor's quick-acting automatic governor controls rotor speeds at all loads. These features provide the speed, power and stamina that get all types of heavy duty grinding done faster . . . easier! Call your nearest Thor branch today for a demonstration.

Thor 360 Series Grinder
Straight, Lever or Grip Handles
Speeds, 3,000 to 6,000 r.p.m
Wheel Sizes, 4" to 8" Diameter, 1" Width.

INDEPENDENT PNEUMATIC TOOL COMPANY
600 W. Jackson Boulevard, Chicago 6, Illinois

Birmingham Boston Buffalo Cincinnati Cleveland Detroit Houston
Los Angeles Milwaukee New York Philadelphia Pittsburgh St. Louis
St. Paul Salt Lake City San Francisco Toronto, Canada London, England

Thor PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

This is Inland 4-Way Floor Plate

Yes, this is Inland 4-Way Floor Plate ... that safe, dependable steel flooring that guards against dangerous slips and falls ... and lasts for years and years.

For floors, steps, walkways, platforms and elevator hatchways, it provides structural strength and safety. The attractive 4-way pattern cleans easily and drains freely.

If your plant, building or product needs added safety under foot or wheel, you'll want to know more about Inland 4-Way Floor Plate ... Available for immediate delivery from conveniently located steel warehouse distributors.

SAFE, ECONOMICAL
EASY TO INSTALL
Write for Catalog

INLAND STEEL COMPANY
38 S. Dearborn Street — Chicago 3, Ill.
Sales Offices: Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul

(*Continued from page* 1016)

Central of Georgia, Savannah, Ga.; on "Research on Wood For Railroad Use" by Dr. Reavis C. Sproull, Southern Research Institute, Birmingham, Ala.; on "Timber Resources of the United States and What They Mean in Crossties," by Edward C. Crafts, chief, Division of Forest Economics, Forest Service, U. S. Department of Agriculture; on "The Future Timber Supply," by C. D. Turley, engineer of ties and treatment, Illinois Central, Chicago; and on "Factors That Enter Into the Cost of a Crosstie," by B. N. Johnson, Koppers Company, Richmond, Ind.

American Railway Engineering Association

At the time of going to press four standing committees had scheduled meetings to be held in October. These include the Committee on Waterproofing, which will meet in Chicago on October 1 and 2; the Committee on Economics of Railway Labor, which will meet at Chicago on October 17; and the Committee on Iron and Steel Structures, at Chicago on October 29 and 30. In addition the Committee on Wood Preservation has scheduled a meeting to be held at Chicago late in the month, with the exact date not yet determined.

A total of 14 committees held meetings during September, of which 9 were held at Chicago during the concurrent conventions of the Roadmasters' Association and the American Railway Bridge and Building Association on September 16-18. These nine committees included those on Roadway and Ballast, Wood Bridges and Trestles, Maintenance of Way Work Equipment, Clearances, Rail, Water Service and Sanitation, Buildings, Records and Accounts, and Track.

The other five committees that held meetings during September were those on Uniform General Contract Forms (Chicago), Highways (Chicago), Economics of Railway Location and Operation (Chicago), Masonry (Niagara Falls, Ont.), and Yards and Terminals (Buffalo, N.Y.).

Supply Trade News

Personal

Joe Weston has been appointed field service director of the **Douglas Fir Plywood Association,** with headquarters at Tacoma, Wash.

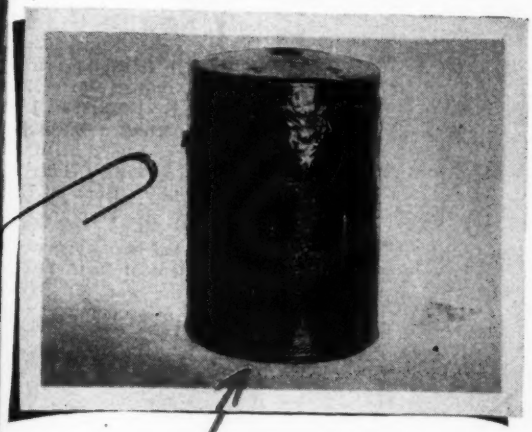
The Philadelphia Steel & Wire Corp. has appointed **L. P. Brassy,** 55 New Montgomery street, San Francisco, Cal., as its agent covering the western territory.

John S. Dimon has been appointed special railway representative for the southeast division for **Bowser, Inc.,** with headquarters in Washington, D. C. Mr. Dimon was formerly industrial sales manager for the Pennsylvania Salt Company.

(*Continued on page* 1020)

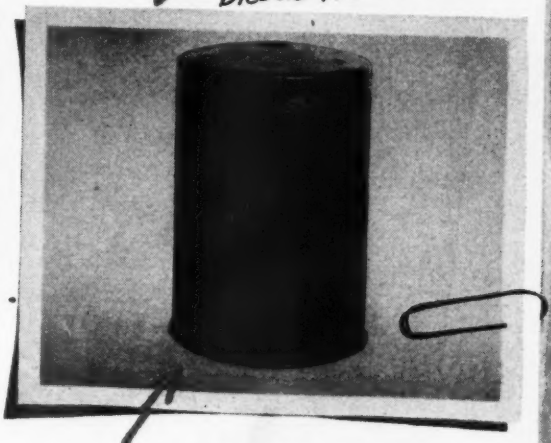
LUBE MEMO

How Joe stopped Filter Clogging



Joe says filters have gummed up like this after about 600 hours on oil he's been using

Joe says nothing but RPM Delo Oil in his Diesels from now on



Here's how the filter looked after 600 hours on RPM Delo Diesel Engine Lubricating Oil Joe finds RPM Delo Oil keeps filters clean because:

1. It's compounded to resist oxidation and minimize sludge.
2. Its "detergent" cuts down sludge.
3. It remains stable in the presence of moisture.

DIESEL ENGINE RPM DELO LUBRICATING OIL

Set up trial on RPM Delo Oil Today!

STANDARD OIL COMPANY OF CALIFORNIA • San Francisco, Calif.
THE CALIFORNIA OIL COMPANY • Denver, Colo.
STANDARD OIL COMPANY OF TEXAS • El Paso, Texas
THE CALIFORNIA OIL COMPANY • New York

YOUR ASSURANCE IT'S DESIGNED RIGHT, BUILT RIGHT...

the RIGHT POWER

TO MEET THE MOST EXACTING REQUIREMENTS

To users, dealers, and builders of gasoline powered equipment the world over, the trade-mark on a Briggs & Stratton engine is more than a label. It is a *seal of quality*—backed by the performance record of over 3 MILLION Briggs & Stratton engines during more than 28 years of *continuous production*. No other manufacturer has built so many 4-cycle air-cooled engines, or has had such long experience in building them. That's why the name BRIGGS & STRATTON stands for all that is best in meeting your most exacting power requirements.

Preferred Power FOR INDUSTRIAL CONSTRUCTION RAILROAD AND FARM EQUIPMENT

BRIGGS & STRATTON CORPORATION
Milwaukee 1, Wisconsin, U. S. A.

(*Continued from page* 1018)

Hubert E. Snyder, formerly with the Penn Metal Corporation, has been appointed managing director of the **Toncan Culvert Manufacturers Association,** to succeed **P. H. Pickering,** resigned.

James G. Graham has been appointed sales manager of the railroad division of **Fairbanks, Morse & Co.** Mr. Graham will continue to maintain his headquarters at the main office in Chicago.

Harry G. Campbell has been appointed sales manager of the Dieselight division of the **Buda Company,** Harvey, Ill. Mr. Campbell previously served for 15 years with the Westinghouse Electric & Manufacturing Co., with headquarters at Pittsburgh, Pa.

Charles F. Nayor has been appointed treasurer and general manager of the **Hastings Signal & Equipment Co.,** to succeed his late father **Harry H. Nayor.** The appointments of **Marshall J. Ross** as sales manager; **Richard B. Dellheim** as safety consultant; **Elmer P. Atherton** as general counsel; **Frank Celona** as plant engineer; and **Ray Cleona** in charge of production, have also been announced.

L. A. Welch has been appointed executive vice-president of **R. G. LeTourneau, Inc.** During the war Mr. Welch was deputy director of production on the War

L. A. Welch

Production Board, at Washington, D. C., and for a short period of time he served as regional director of the W. P. B., at Detroit, Mich. He is president of the Avery Farm Machinery Company, a director of the Commercial National Bank, and a former president of the Hart Oil Company, all at Peoria, Ill.

Granville M. Fisher has been appointed railway finishes salesman in the New England and New York areas for the finishes division of **E. I. du Pont de Nemours & Co.,** with headquarters in New York, to succeed the late **Roy A. Phelps.**

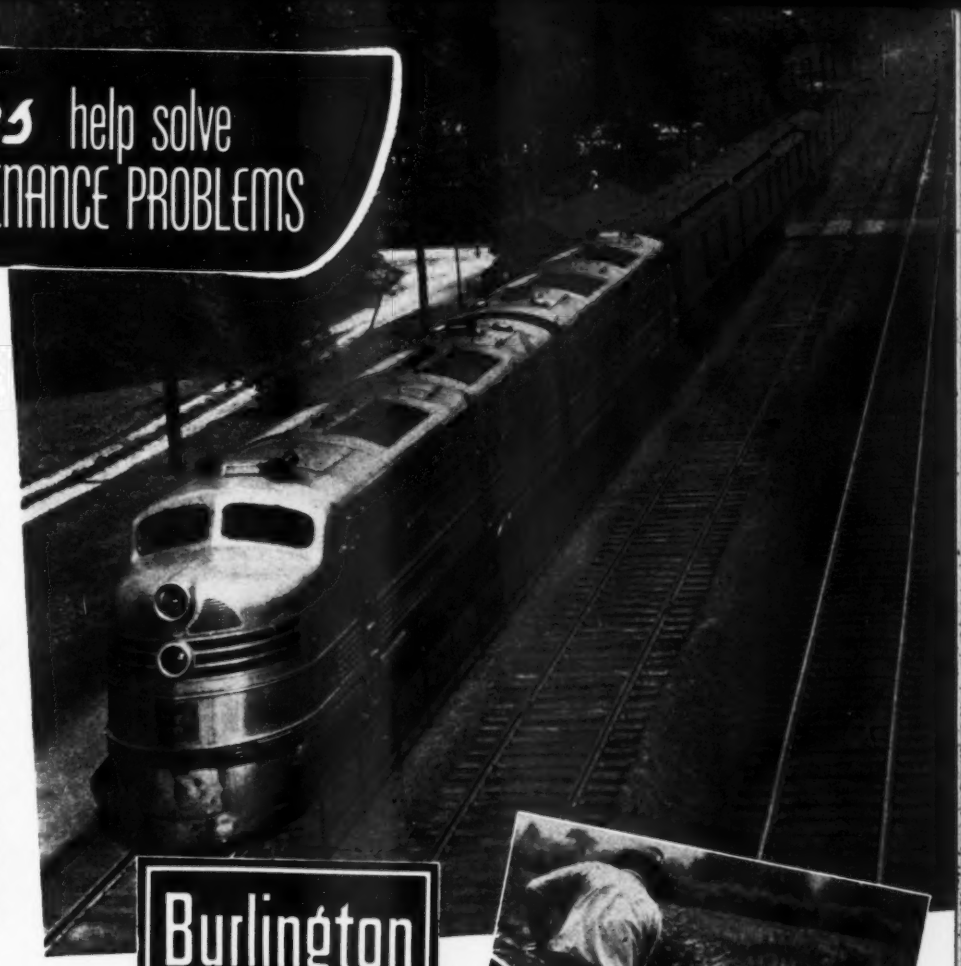
The **American Steel & Wire Co.** has announced the following personnel changes in the sales department of its Cyclone Fence division: **E. Kyndberg,** formerly district sales manager of the Waukegan, Ill., office has been appointed general sales

(*Continued on page* 1022)

Machines help solve TODAY'S MAINTENANCE PROBLEMS

The Burlington, powering its popular Zephyr fleet and other fast passenger trains with the newest in Diesel equipment, is one of America's progressive railroads using machines to help keep its roadbed fit.

On the Burlington, tie replacement and rail renewal jobs are facilitated by the use of WOOLERY TIE CUTTERS and WOOLERY CREOSOTE SPRAYERS.



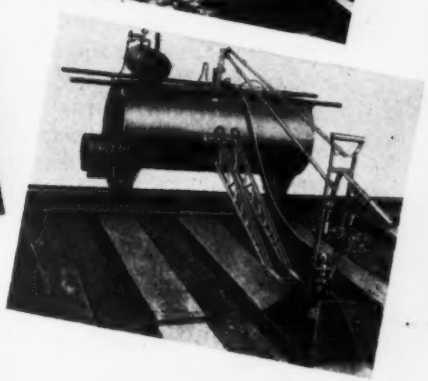
Burlington Route

THE MODEL "N" TIE CUTTER

is an improved machine at a substantial reduction in price. It eliminates the slow, laborious, back-breaking expensive features of tie replacement by old methods, without trenching or jacking up of track, and with a minimum of disturbance to ballast. A reciprocating cutting blade cuts tie into three pieces, at an average speed of 25 seconds per cut. Ends of the cut tie are easily pried out with a bar, using the center section as a heel. The center section is then lifted from the rail and a new tie seated on a firm permanent base requiring little or no tamping.

THE WOOLERY CREOSOTE SPRAYER,

with 60 gallon tank capacity, needs only two men to operate. Equipped with generator burner to heat creosote, and wind protection hood to safeguard operators, it applies a metered amount of creosote to each freshly-adzed tie. The WOOLERY sprayer does a safer, less expensive, more uniform job than is possible by old-fashioned hand swabbing or broom-and-pail methods.



WRITE FOR complete information and performance data on Woolery Tie Cutters and Woolery Creosote Sprayers.

ABOVE: Cutting operation in progress. RIGHT, above: End pieces of cut tie are easily pried out, center pieces lifted from between rails. RIGHT: Creosote Sprayer speeds rail renewal work.

WOOLERY MAINTENANCE MACHINERY

Weed Burners — Tie Cutters — Creosote Sprayers

WOOLERY MACHINE COMPANY

MINNEAPOLIS — Pioneer Manufacturers of — MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

RAILWAY WEED BURNERS · MOTOR CARS · TIE CUTTERS · TIE SCORING MACHINES · RAIL JOINT OILERS · CREOSOTE SPRAYERS · BOLT TIGHTENERS

EXCLUSIVE EXPORT REPRESENTATIVES PRESSED STEEL CAR COMPANY, INC. PITTSBURGH, PENNA.

Lift ferrous metals *this way*

to keep handling costs *down*

MAGNETIC MATERIALS HANDLING is a *proved way* to offset higher hourly wage scales.

Ohio Magnets, for example, whisk strip steel coils from one plant area to another *without handling assistance on the floor.*

There is a specific Ohio Magnet for every *hot or cold* ferrous metal handling job: billets, slabs, ingots, scrap, plate, coils, sheets, rails, wheels, etc. Round magnet sizes range from 12 to 65 inches diameter. Rectangular Ohio Magnets are available in sizes from 25 to 85 inches long.

Ohio Magnets feature heavier construction for *longer life.* This extra weight is *distributed* throughout copper coils, insulation and steel frame — for greater lifting efficiency.

Here's an important maintenance feature too. Ohio chain ears last longer because they have *square holes* for chain pins to eliminate friction.

Many Ohio Magnets sold 25 years ago are *still in use* . . . still cutting costs. They are an even better investment today. Call on Ohio: *a leader in magnetic materials handling.*

Ohio MAGNETS

also a leading name in the fractional H. P. motor field

THE OHIO ELECTRIC MFG. CO.

5916 MAURICE AVE. • CLEVELAND 4, OHIO

(*Continued from page* 1020)

manager of the division, with the same headquarters; **J. F. Boyce,** formerly sales manager of the southeastern district, has been appointed district sales manager at Waukegan; **R. W. Ewart,** who has been serving in a sales capacity in Cleveland, Ohio, Buffalo, N. Y., and Savannah, Ga., has been appointed sales manager of the southeastern district, with headquarters at Savannah, and **J. D. Filer,** who has been a salesman in the Newark, N. J., office, has been promoted to assistant district sales manager of the eastern district, with the same headquarters.

Roy E. McCluskey, formerly assistant treasurer of **R. G. LeTourneau, Inc.,** has been advanced to vice-president in charge of sales. Mr. McCluskey, who joined

Roy E. McCluskey

LeTourneau in 1941, will direct the company's sales division and other related departments.

H. H. Talboys, division manager, railway equipment, **R. W. Bayerlein,** division manager, heavy machinery, and **D. A. Cheyette,** division manager, crusher division, all of the **Nordberg Manufacturing Company,** Milwaukee, Wis., have been promoted to vice-presidencies. A photograph of Mr. Talboys and a sketch of his career appeared in the July issue.

O. L. Howland has been appointed sales manager of the welding division of the **Metal & Thermit Corp.,** with headquarters in Chicago. The appointment of **William C. Cuntz** as assistant sales manager of the welding division, with headquarters at Pittsburgh, Pa., also has been announced.

C. W. Merriken, Jr., sales representative of the **Simmons-Boardman Publishing Corporation,** at Chicago, has been promoted to sales manager, transportation publications, Eastern district, with headquarters at New York. Mr. Merriken was born at Baltimore, Md., on August 12, 1907, and received his higher education at the University of Illinois. He entered railway service in 1930 as a chainman on the Chicago & North Western, and one year later he went with the Chicago, Milwaukee, St. Paul & Pacific as a rodman at Chicago. From 1932 to 1935 he was associated with the sales department of the Pure Asphalt Company at

(*Continued on page* 1026)

ADDITIONAL INFORMATION

On Any of the Products Mentioned in This Issue

Below is a complete index of the products referred to in both the editorial and advertising pages of this issue. If you desire additional information on any of them, use one of the accompanying addressed and stamped postcards in requesting it. In each case give name of product and page number. The information will come to you directly from the manufacturer involved, without any obligation on your part.

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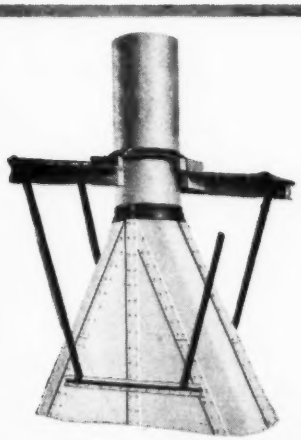

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The latest development in Transite Smoke Jacks is the Class P Jack shown above, which reduces fastenings and battens to a minimum. The contour of this jack is such that eddy currents and gas pockets are also minimized, providing a high rate of gas removal.

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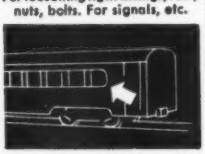
For windshield wipers; cabin door, other hinges.

For loosening tight fittings, rusty nuts, bolts. For signals, etc.



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(*Continued from page* 1022)

Chicago, and in the latter year he returned to the North Western as a rodman on the Galena division. In March, 1938, Mr. Merriken joined the Belt Railway of Chicago as a rodman, and in October of the same year he resigned to become an associate editor of the Railway Engineering and Maintenance Cyclopedia. On March 4, 1940, he was appointed to the position of sales representative.

C. W. Merriken, Jr.

Fred Smith has been appointed sales representative for all transportation publications of the **Simmons-Boardman Publishing Corporation,** with headquarters at Chicago. Mr. Smith was born at Coal Valley, Ala., on December 31, 1910, and after graduation from high school, completed a course in civil engineering with the International Correspondence Schools. During the summer vacations of 1924 and 1925 he served as a rodman with the Dixie Construction Company. In 1926 he entered the service of the State Highway Department of Alabama as transitman and draftsman, and in 1929 he was employed as an extension clerk by the Birmingham Electric Company, where he remained until January, 1936, when he became a bridge inspector for the Woodward Iron & Railroad Co. In May, 1936, Mr. Smith entered the service of the Birmingham Southern as transitman-draftsman, and on February 1, 1941, he was employed as party chief by Alvord, Burdick & Howson, consulting engineers, Chicago. Five months later he joined the Chicago, Rock Island & Pacific as engineer-estimator, and served in that capacity until January, 1945, when he entered the service of Simmons-Boardman as associate editor of the corporation's **Railway Engineering & Maintenance Cyclopedia,** at Chicago. On October 16, 1945, he was appointed associate editor of **Railway Age.**

Obituary

W. F. Hebard, president of W. F. Hebard & Co., Chicago, died on September 4 at Evanston, Ill.

(*Continued on page* 1028)

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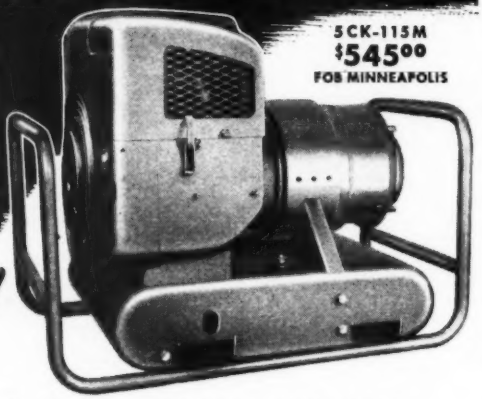

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BUCKETS • AGGREMETERS • PORTABLE CONCRETE PLANTS

(*Continued from page* 1026)

Harry H. Nayor, former treasurer and general manager of the Hastings Signal & Equipment Co. of Boston, Mass., died recently.

Maurice Hoff, general production manager of the Hyster Company, died on August 22, at Portland, Ore.

P. A. Wells, Jr., assistant chief engineer and secretary and treasurer of the Maintenance Equipment Company, Chicago, died at Bryan, Ohio, on September 2, as the result of a heart attack. Mr. Wells was born at Oak Park, Ill., on May 17, 1910, and studied civil engineering at the University of Illinois. He was engaged

P. A. Wells, Jr.

in general construction work until September, 1936, when he entered the service of the Maintenance Equipment Company as a draftsman. In 1938 he was appointed service engineer, and in January, 1943, he was advanced to assistant chief engineer. In 1945 he became, in addition, secretary and treasurer of the company.

Trade Publications

(To obtain copies of any of the publications mentioned in these columns, use postcards, page 1023)

Caterpillar Earthmoving Equipment—The Caterpillar Tractor Company's new 16-page booklet—"Earthmoving Calls for Caterpillar"—is devoted to showing the company's wide range of equipment working at an equally wide range of applications. The booklet is profusely illustrated with action pictures which vividly exhibit the use of Caterpillar tractors, trailer units, bulldozers, scrapers, graders, Diesel engines, and electric sets on earthmoving projects connected with railroad work, road building and maintenance, housing construction, logging operations, mine stripping, and crushing and gravel plant operations.

Sanding Equipment for Diesel Locomotives—The Ross & White Co. has just issued a new bulletin, No. 64, which describes and illustrates the company's dry sand towers for sanding Diesel locomotives, and related sanding equipment. Also included is information concerning

(*Continued on page* 1030)

FOUNDATION JOBS GO FAST with this pipe piling

When heavy construction projects go on your drafting boards, you'll want to look into the time-saving, money-saving possibilities of ARMCO Welded Steel Foundation Piling.

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ARMCO Welded Steel Pipe is economical for water lines of all kinds. Supplied with special coatings for water service in 6" to 36" diameters. Also special prefabricated fittings.

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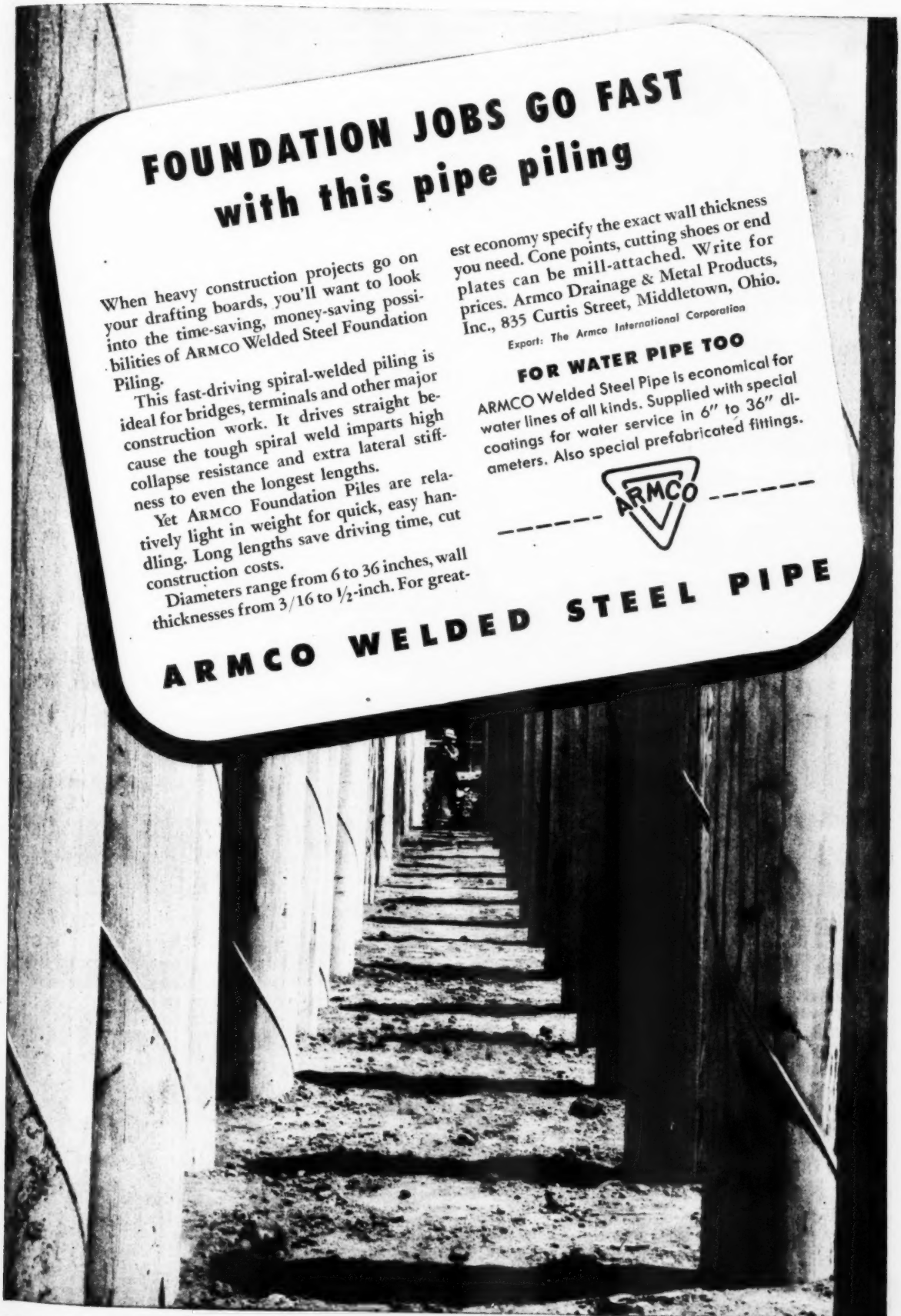

(*Continued from page* 1028)

the company's coaling plants and railroad car washers. The bulletin is well supplied with photographs and line drawings of details and complete installations.

Armco Underpasses and Service Tunnels—Armco Drainage & Metal Products, Inc., has published a well illustrated 24-page book bearing the title "Manual of Underpasses and Service Tunnels." It deals with problems of providing underground passageways for people, livestock, merchandise, and utility lines, and furnishes information concerning the construction of underpasses, conduits and tunnels. In addition to information on sizes and shapes of openings and the methods of making them, the manual describes the types of metal structures available, and gives suggestions concerning floors, drainage, lighting, brackets, and conveying equipment. Several pages are devoted to conveyor tunnels.

Industrial Wheel Tractors—Published by the Industrial Power Division of the International Harvester Company, this new 24-page, 2-color tractor catalogue, No. A-103-JJ, describes and illustrates three models of heavy-duty tractors powered by gasoline engines which can be equipped to burn kerosene or distillate; two models of Diesel-powered heavy-duty tractors, and a light tractor powered with a gasoline engine and designed for highway moving and similar applications. All important features of the engines are explained in text and pictures; chassis construction is illustrated by sectional views. Complete specifications and the locations of 140 distributors are included.

Flintkote Industrial Products — The Flintkote Company, Industrial Products Division, has published three product data sheets. No. 206, Series 1-C, is devoted to Flintdek, a synthetic plastic floor coating incorporating a mineral type filler. No. 601, Series 1-H, deals with Flintseal, a hot-poured joint-sealing compound of the rubber asphalt type. No. 215, Series 1-C, describes Flintkote aluminum paint, compounded of selected asphalts, aluminum flake, and solvents.

Power Transmission Machinery—The Link-Belt Company, 307 N. Michigan Avenue, Chicago 1, has published and has ready for distribution a 16-page booklet, No. 2085, dealing with the company's Electrofluid power transmission units which, it is stated, make the electric motor more flexible in operation and overcome the problem of inadequate torque and excessive current consumption under starting conditions. The booklet is well illustrated, carries installation diagrams, and contains suggestions for a wide range of applications.

Apron Feeders—The Pioneer Engineering Works, Inc., 1515 Central avenue, Minneapolis 13, Minn., has issued Bulletin No. 563, containing eight pages, which describes and illustrates Pioneer apron feeders for pit, mine and quarry materials. The bulletin contains specifications of the various types and sizes of standard feeders, and provides data on capacities, dimensions, weights, speeds, drives, and power requirements.

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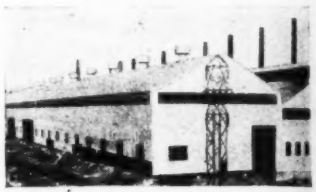

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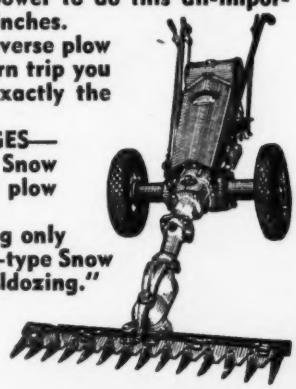

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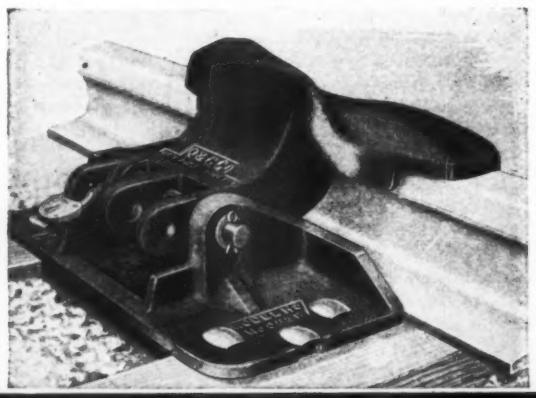

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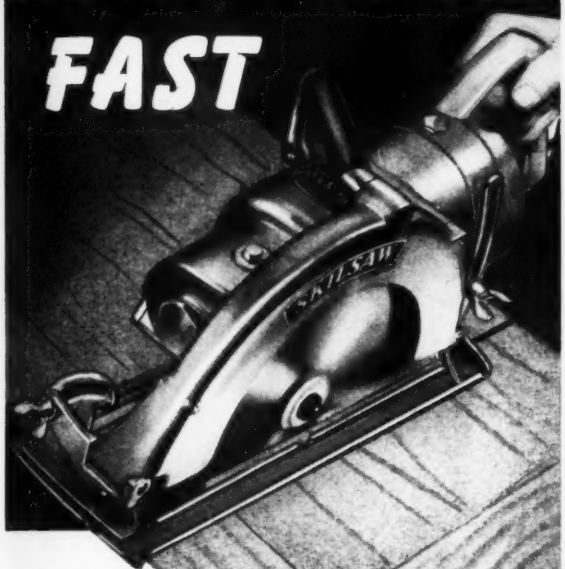

WITH POWERFUL 12 INCH PNEUMATIC SKIL SAW

• This sturdy SKIL Saw cuts 4⅜ inches deep . . . rips or cross-cuts 4 inch timbers 10 times faster than by hand . . . bevel-cuts 3¼ inch lumber at 45° . . . cuts 8 inch timbers in two quick cuts. It also cuts concrete, stone, marble, terra cotta and other building materials including light gauge metals. There isn't a better saw for bridge and building gangs using air for power. Ask your SKIL Tool Distributor today for a demonstration.

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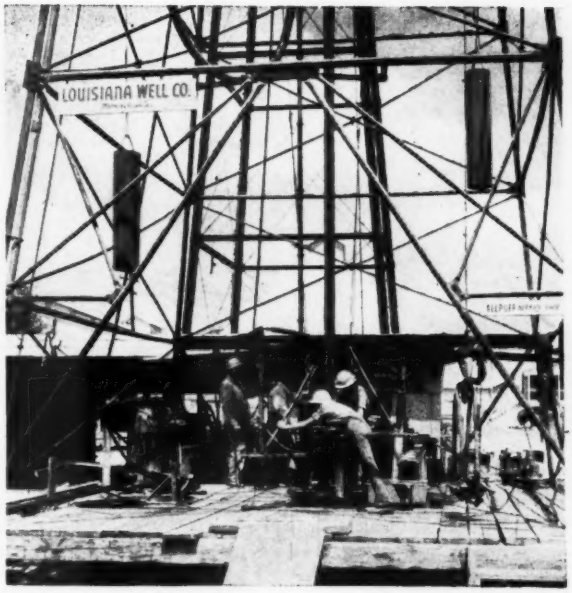
5033 Elston Ave., Chicago 30, Ill.
Factory Branches in Principal Cities
In Canada: SKILTOOLS, LTD., 66 Portland St., Toronto, Ont.
*SKIL Saw is made only by SKILSAW, INC.

ELECTRIC PNEUMATIC
SKILTOOLS

MADE BY SKILSAW, INC.



4 LAYNE UNITS FOR WEST MONROE, LA.

The city of West Monroe, Louisiana will soon have four complete Layne Well Water Supply units and an adequate supply of water to fulfill the needs of a growing and thriving oil metropolis. The first two were bought on confidence in the name Layne . . . but the third and fourth purchases were based upon known knowledge of how Layne Well Water Systems perform.

West Monroe city officials know the cost of operating these systems, how they keep steadily on the job with little or no upkeep cost . . . and how they fulfill every claim made by Layne.

Layne Well Water Systems are engineered and built to serve cities, factories, chemical plants, railroads, packing plants and air conditioning and irrigation projects. They have the extra ruggedness of quality and precision type of construction that gives complete satisfaction.

If you are in need of more water, Layne Engineers will gladly make valuable and dependable recommendations. For literature ddress

LAYNE & BOWLER, INC.
General Officers:, Memphis 8, Tennessee

• **pumps for wells, lakes, rivers, reservoirs, irrigation —or for any use where large quantities of water must be produced at low cost. Sizes range from 40 to 16,000 gallons per minute. Write for Layne Pump Catalog.**

LAYNE WELL WATER SYSTEMS

vertical turbine pumps

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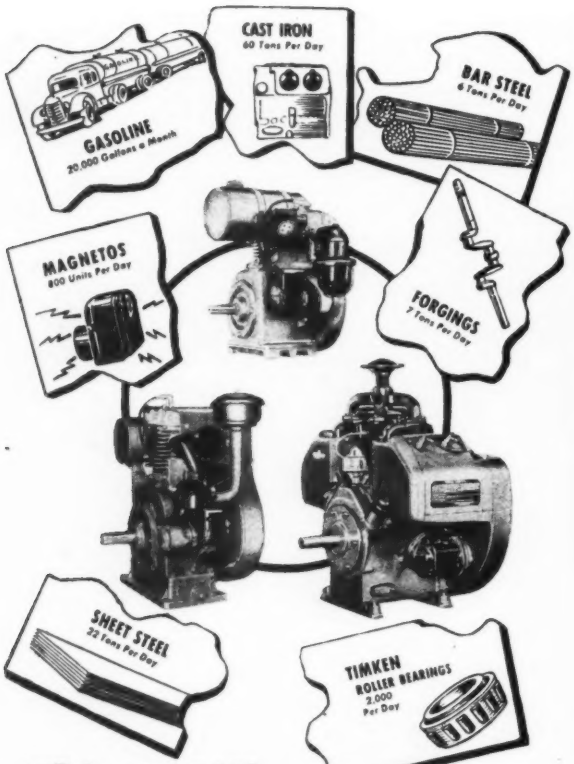

This Is What It Takes to Build WISCONSIN *Air-Cooled* ENGINES

In terms of freight tonnage, the materials and components used in making Wisconsin Air-Cooled Engines would total up something like this:

Sheet Steel	550 tons per month
Forgings	175 tons per month
Bar Steel	150 tons per month
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That's a lot of tonnage. Over and above this, we use 20,000 Magnetos per month and 50,000 Timken tapered roller bearings . . . not to mention 20,000 gallons of gasoline per month for factory test runs of Wisconsin Air-Cooled Engines.

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Most H.P. per pound WISCONSIN MOTOR Corporation
MILWAUKEE 14, WISCONSIN, U. S. A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines

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A tough track job requires toughness in tools . . . and that's just where the Warwood Claw Bar comes in. Accurately forged, correctly designed and scientifically heat treated to meet A. R. E. A. specifications . . . it is made for a tough job. Whatever the job in track maintenance and repair work . . . there's a Warwood Track Tool especially made for it. Specify and buy Warwood Track Tools.

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BARS . . TONGS . . SLEDGES . . ADZES
PUNCHES . . . CHISELS

WARWOOD SINCE 1854 FORGED TOOLS

WARWOOD TOOL COMPANY
WHEELING, WEST VIRGINIA

UNIT CRANES "Tailor-made" for Railroad Jobs

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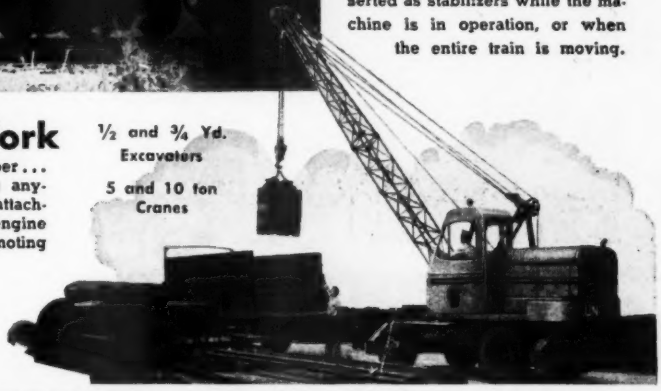
Mobile UNITS for Yard Work

UNIT 357 Mobile Crane is self-propelled... Rides on rubber... Ready for action with a push on the starter... Travels anywhere... gets there in a hurry. Fully convertible to all attachments... Operated by ONE man... Powered by ONE engine ...Controlled from ONE position in UNIT's safety promoting FULL VISION CAB.

½ and ¾ Yd. Excavators

5 and 10 ton Cranes



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THE POWERFUL ONE-MAN "GANG-OF-ALL-WORK" THAT'S SYNTRON

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Save Money for You

BUSTING Concrete
CUTTING Asphalt
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- **Fast travel speeds—up to 22 M.P.H.**
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- **Short tail swing — will not foul adjoining track.**
- **Low overall height — Burro can be loaded and worked on a standard flat car. (See below)**

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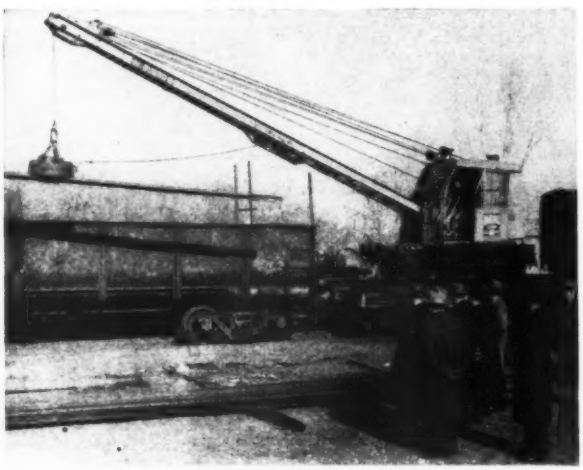

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REG. U.S. PAT. OFF.

Rail Drill Attachment

POWERED BY MALL

GASOLINE ENGINE ***RAIL UNIT***

Here's a new Mall Attachment that converts your Mall Rail Grinder Power Unit into a fast and accurate Rail Drill. Every feature of this Mall Rail Drill is adapted to the drilling needs of the right-of-way. It has the power to put 1-1/16" holes through 100 or 112 pound rails in less than a minute . . . it is light in weight so that it can be carried from place to place . . . it is easily removed for passing trains . . . and it is short in length to allow convenient use on narrow switch sections. It can also be used for drilling "I" beams and girder rails.

The Mall Rail Drill is one of many attachments for track maintenance that operate from the Mall Rail Grinder—a 6 H.P. Gasoline Engine Power Unit with a wheel barrow mounting for on or off the track use.

Write for literature and prices.

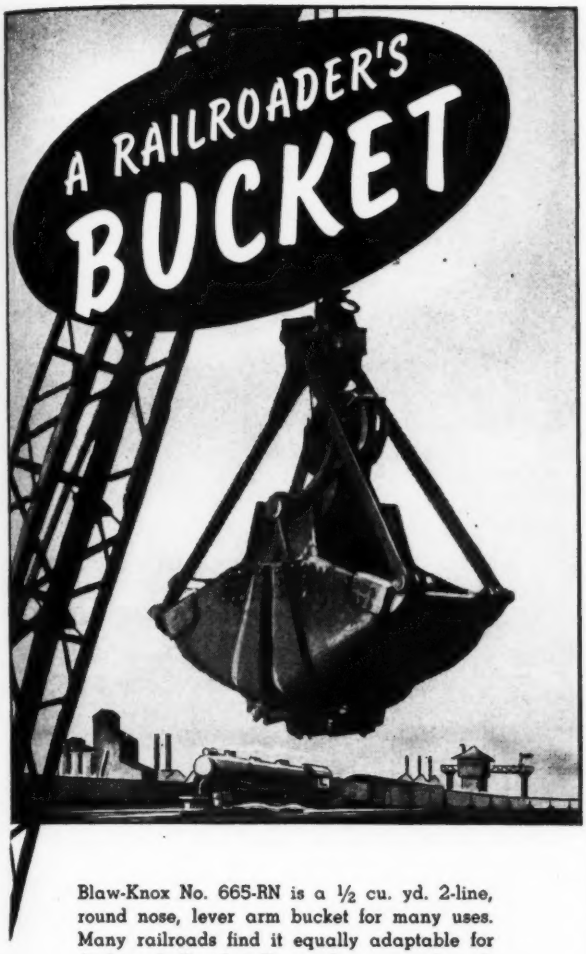
Railroad Department

MALL TOOL COMPANY

7746 South Chicago Ave. Chicago 19, Illinois

MALL REPRESENTATIVES: Power Tools, Inc., St. Paul; Allied Tools & Supply Co., Louisville; George A. Secor, St. Louis; John N. Thorp Co., New York.

Mall REG. U.S. PAT. OFF. **PORTABLE POWER TOOLS**



Blaw-Knox No. 665-RN is a ½ cu. yd. 2-line, round nose, lever arm bucket for many uses. Many railroads find it equally adaptable for ditching, ballast handling, refuse removal, coaling, etc. Like all Blaw-Knox Buckets, it gets more work done with less crane time. For a quick look at the many types and sizes of Blaw-Knox Buckets in railroad use—write today for Bulletin No. 1989.

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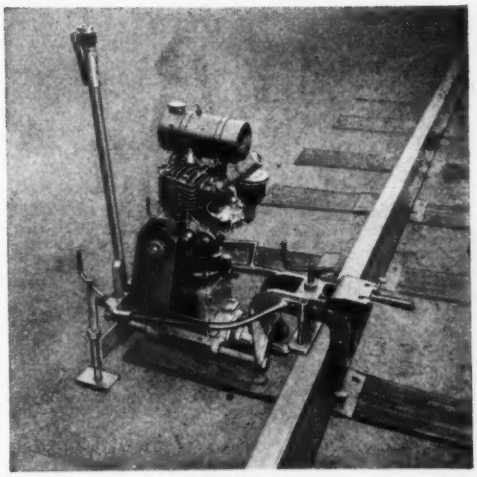
Designed for Savings..



Model P-34-A Power Track Drill

new RTW *power track drill*

Modern in design, up-to-date in construction, this new track drill embodies many features that help speed rail maintenance at materially reduced costs.

The P-34-A consists of a 1½ hp air-cooled gasoline engine, with V-Belt drive from the engine shaft to a counter shaft which drives drill through a gear reduction assembly.

Gear reduction housing is cast aluminum to reduce weight. Steel frame, of lasting strength and durability, is designed to provide fast, accurate leveling with rail and irregular or uneven ground. There is also ample adjustment to various rail sizes.

For easy operation, lateral travel for feeding drill is controlled by a ratchet gear and rack. The chuck will take a flat beaded bit up to 1½ inches and will drill a hole in less than a minute.

Belt is adjusted by raising or lowering motor on frame. Guards are installed for protection around frame.

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Further information on the P-34-A and other RTW machines sent on request.

Railway Track-work Co.
3207 KENSINGTON AVE., PHILADELPHIA 34, PA.

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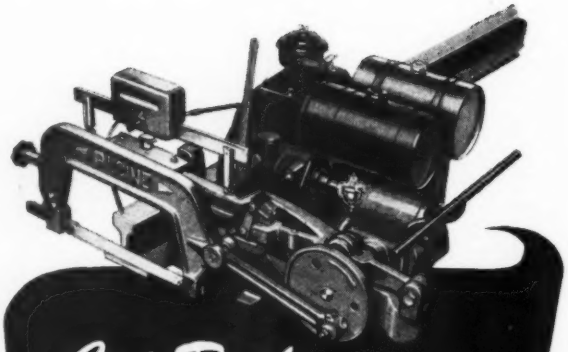

Cut Rail . . .
RIGHT ON THE TRACK
with . . .

RACINE PORTABLE Rail Saws

Your track maintenance and repairs can be speeded up with Racine Portable Rail Cutting Machines. This equipment cuts rail ends right on the track. No extra handling or hauling of the rail to central cropping plant.

Only one man needed to operate the Racine Rail Saw. Two men can easily carry it from rail to rail. These fast, accurate machines produce smooth, clean cuts without the overheating of rail ends that so often starts fractures leading to rail failure. Model 15 for rails to 7⅜" high; Model 16 for rails to 10" high.

SIX COMMON JOBS FOR THIS MACHINE

1. Cutting and fitting rails at interlocking plants, crossings and switches.
2. Closing track in rail-laying operations.
3. Smooth, accurately cut rail for insulated joints.
4. Proper staggering of joints in curves.
5. Removing split, worn and battered rail ends.
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Models are available with gas engines, compressed air or electric motors. Write for complete catalog No. 58A. Address RACINE TOOL AND MACHINE CO., 1738 State St., Racine, Wisconsin.

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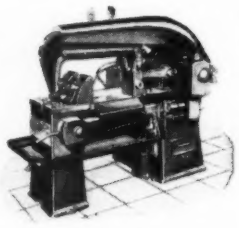

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RACINE
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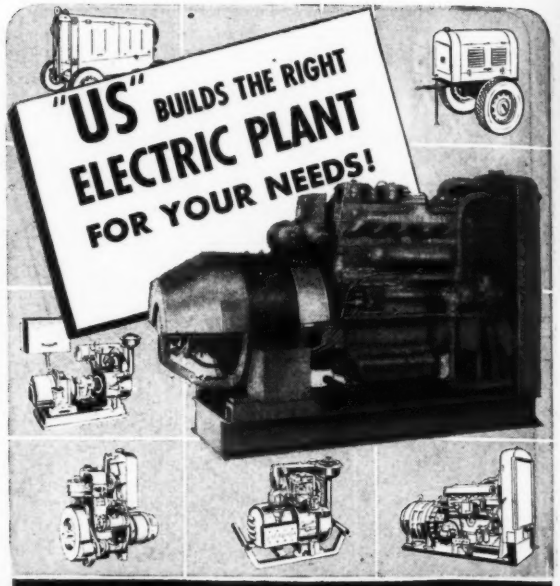

The "US" line is complete—Gasoline and Diesel units from ½ to 140 kw. AC or DC. Compact Portable units . . . dependable Stand-by units . . . and rugged units for Continuous Duty.

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Our Client, an established manufacturer, wants new Products or new ideas that might be developed into new products. We are fully compensated by our client.

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NEW PRODUCTS NEW PROCESSES

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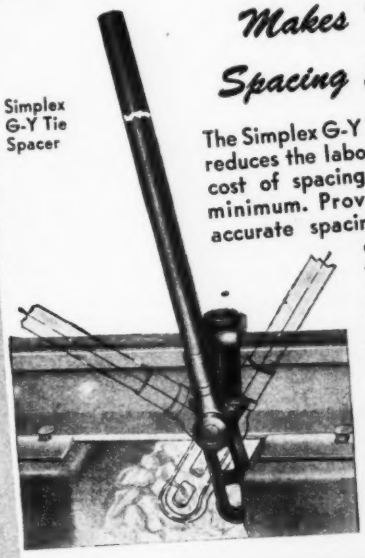
Makes Tie Spacing Easy

Simplex G-Y Tie Spacer



The Simplex G-Y Tie Spacer reduces the labor and time cost of spacing ties to a minimum. Provides more accurate spacing without damage to ties. Safety stops control the working arc. Slides from tie to tie, and is quickly applied or disengaged.

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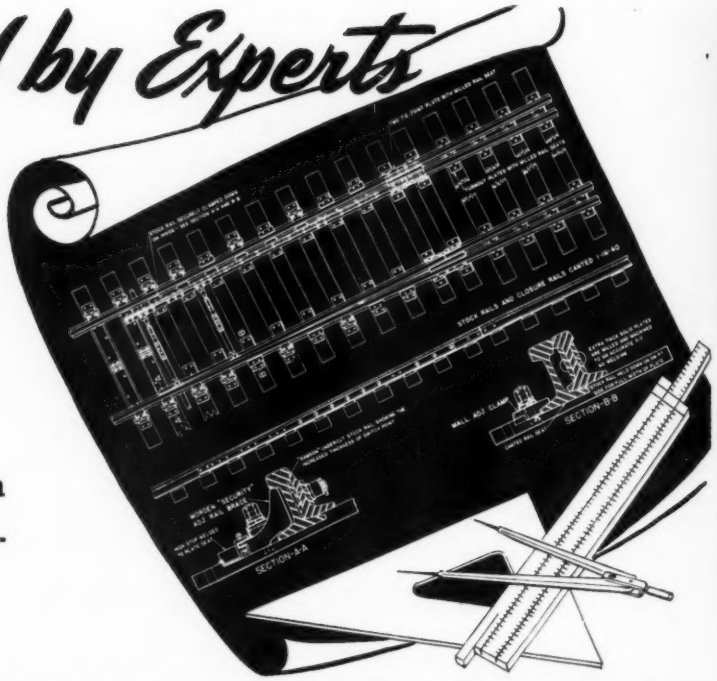

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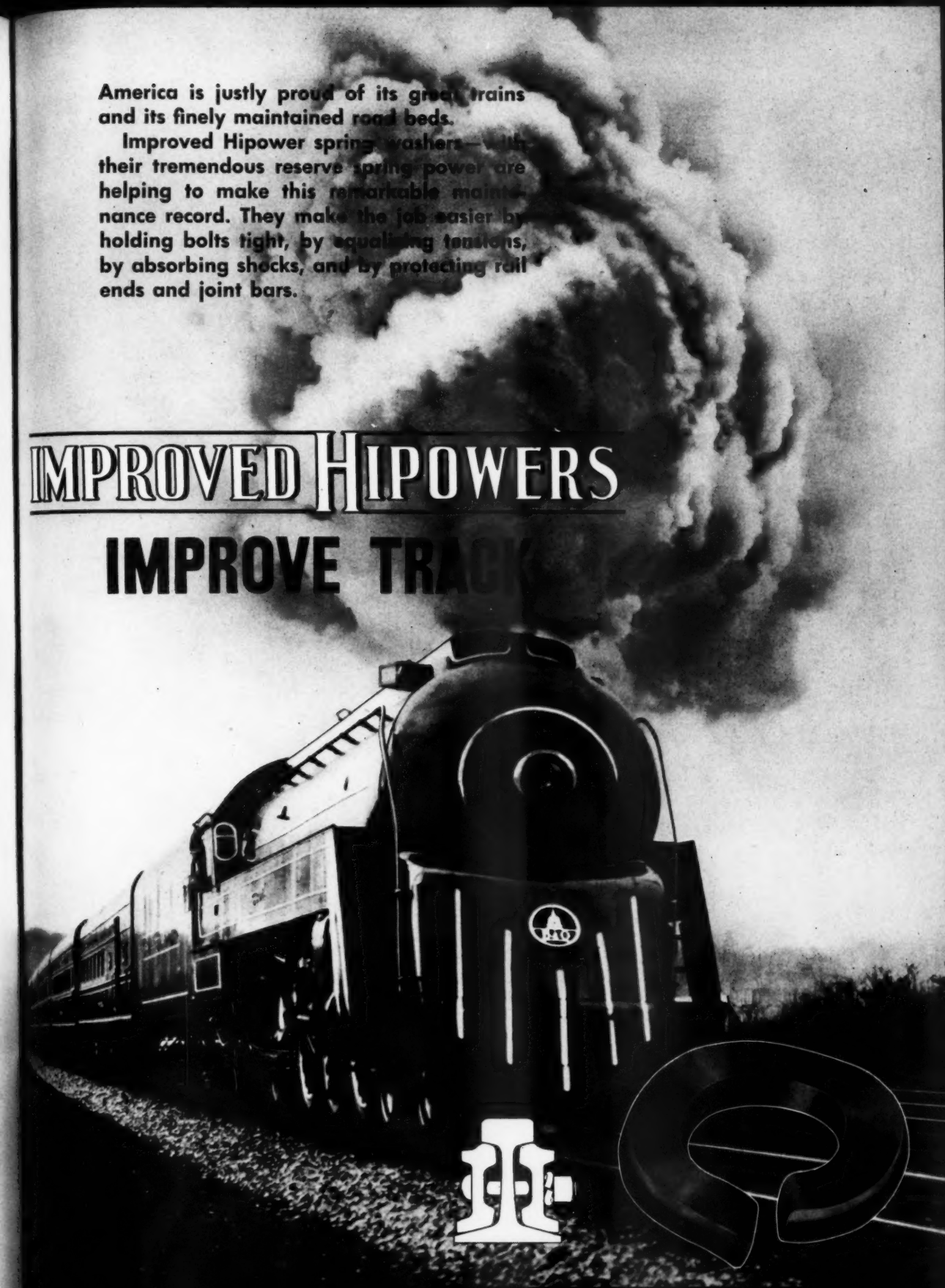
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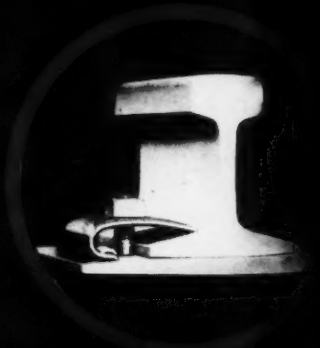

The Rails Company, 178 Goffe St., New Haven 11, Conn.